the OIL AND GAS JOURNAL

SEPTEMBER 9, 1957

A look at

Four Corners... YOUNG OIL GIANT

p. 83

UTAH COLORADO
ARIZONA NEW MEXICO

› What Refiners Can Expect in Jet Age p. 51

› Biggest Propane Flood Hits Stride p. 58

› Hydrogenation Process Makes Debut p. 71

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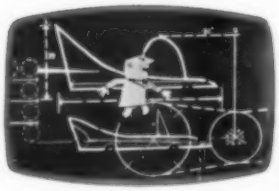

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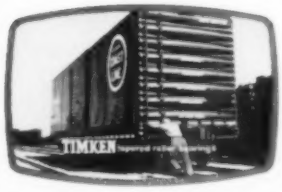

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Years of national and trade advertising, backed by their superior performance, have made "Timken" the best-known name in bearings—a name that helps to sell the products that use Timken® bearings. Now, network television will build an even greater awareness of Timken bearings—make them an even bigger sales plus in the equipment you sell. The Timken Roller Bearing Company, Canton 6, Ohio. Cable address: "TIMROSCO".

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JOURNAL News Letter

Sept. 9, 1957
Tulsa, Okla.

Texas may be facing low oil allowables for years to come:

Chairman Olin Culberson of the Texas Railroad Commission is giving that warning privately to the state's oil producers.

He tells oil men not to expect any great relief from efforts by the federal Government to limit oil imports.

He adds that Texas' current 13-day producing months may not prove so temporary. It was designed to bring supplies and demand into balance quickly. Culberson's warning: Texas may not enjoy another 15-day producing month for 5 or 6 years.

Magnolia's latest move to prorate purchases in a five-state area including Texas underscores Culberson's warning. It also is a good indication of the soft market conditions in the Southwest.

Magnolia sliced purchases for September by 10 per cent of its take in August. It already was taking 15 per cent less than it bought in May.

Gulf likewise is prorating purchases in about the same area. Smaller buyers in several states are doing the same.

This means that many oil producers won't be able to market even their allowed production--low as it is.

It also means that many producers, particularly in Texas, whose wells aren't connected to a pipeline are finding a market vanishing for their oil. This explains the fight brewing in Texas to divorce crude buying firms from their subsidiary common carrier pipelines. The producers want everyone's oil to have an equal share of existing markets.

Louisiana producers also are having their troubles.

Conservation Commissioner John B. Hussey has issued his long-expected order requiring ratable take of oil from a Louisiana field.

Hussey is attempting to force Sun Oil to buy equitably from all producers in University field of East Baton Rouge parish. His decree is similar to orders now being fought out in Texas and Oklahoma courts.

Baton Rouge independent T. G. Markley brought the issue to a head. He complains Sun declined to take his 380-bbl. daily production but is buying from other operators in the field. He claims unfair discrimination.

Sun says Markley diverted his oil from Sun during the emergency and sold it at a premium price to a small refiner. When he lost this market, Sun refused to take back the production.

Entry of foreign oil capital into Mexico has received a slap.

Alfonso Diaz Garza, president of Cadena Internacional Bancos, stirred up the tempest. Addressing a bankers convention, he said the foreign oil companies produced more oil with fewer workers in Mexico than the government industry does today after expropriation.

This enraged Mexico's powerful oil workers union. It fought back with full-page newspaper ads vowing a fight to the death against reentry of foreign oil capital.

The furor arose after prominent government officials including the popular Antonio Bermudez, head of Pemex, had made cautious comments indicating that foreign capital may be invited to help bolster Mexico's oil effort.

World's biggest miscible-phase displacement project is in full swing in Parks Pennsylvanian field of West Texas (p. 58).

Propane is being pumped down 23 input wells at rate of 7,300 bbl. daily. It will continue for 9 months. Then 16,000 M.c.f. of gas daily will be injected to keep the miscible zone moving across the reservoir.

Magnolia engineers don't expect any upturn in production for some time. In fact they hope nothing happens for 18 months.

Their reasoning: There's much pore space in the reservoir to be filled. Early production kicks would indicate channeling instead of a steady movement of the oil on a broad front.

Eventually Magnolia believes the project will lengthen life of field from 6-1/2 years to about 12 years and increase oil recovery by 100 to 150 per cent.

A new type liner has made its appearance on the West Coast.

It's a double-walled affair achieved by taking a standard slotted liner and welding short convex-shaped forged perforated sections onto it.

Don Fether, its designer, says field tests show the liner is a valuable tool where sand control and pipe collapse are problems (p. 55).

Free-world production has reached record high of 15,964,200 bbl. daily.

Record Middle East output was responsible despite sharpest drop in U. S. production in 5 years.

Persian Gulf area in June averaged 3,957,500 bbl. daily, up 401,400 bbl. daily or 11.3 per cent in one month.

U. S. cut its production 335,000 bbl. daily to 7,107,000 bbl.

A revolution in aviation fuel is quietly taking place.

It has far-reaching effects on the entire oil industry.

The jet age is nearly here. U. S. military has taken its last piston

plane. Commercial lines will take their last ones next year. Then most all new planes will be jets.

The jet-fuel demand already exceeds that for avgas, and the conversion to jets is just getting started.

Big factor for refiners in the new era: Tremendous prospective demand for fuel which the new planes will generate (p. 51).

Refiners now have a new process for deep hydrogenation of heavy residuals. It's called H-Oil process by its originator, Hydrocarbon Research, Inc. (p. 71).

The process uses a standard commercial desulfurization catalyst. For severe hydrogenation, it will be teamed with synthesis gas process licensed by Texaco Development and Hydrocarbon Research.

The technique licks the problem of temperature rise in the catalyst bed. This makes it a workable continuous operation without frequent cycling and regeneration of coked-up catalyst

A wide variety of stocks can be used, and payout is about 17 months.

Several economic factors, however, will govern areas where H-Oil process will be used. Factors include market for coke, the spread in prices of residual and distillate fuels.

Petroleum may displace coal in a brand new direction: Processing iron ore.

A new H-Iron process, also developed by Hydrocarbon Research, is one of several techniques involving use of hydrogen instead of traditional coal coke in processing iron ore.

The hydrogen needed can come from natural gas or Bunker C fuel oil, depending on the economics. Houston or Venzuela loom as prize locations for first commercial application of the new principle.

First unit to isomerize low-octane normal pentane to high-octane isopentane is getting under way at Gulf's Port Arthur refinery.

Several other isom units are in the engineering and planning stages. One which will process hexane is being built at Atlas Processing's plant at Shreveport.

Summer slump apparently hit octanes.

Ethyl Corp.'s monthly survey shows premium averaging 98.1 in August and regular 90.9. That's a drop of 0.1 number for each.

The leveling off was believed caused by refiners pulling light ends out of their gasoline during the summer to prevent evaporation losses.

Refiners will be interested in the savings made by D-X Sunray Oil Co. after it installed bauxite filters in its sulfuric acid alkylation plant at its Tulsa refinery.

The filters mean daily savings of:

$175 in maintenance and down time, $50 in neutralizing and inhibiting costs, $33 in acid catalyst, and $600 in TEL when alkylate is used in motor fuel (p. 103).

Corrosive effects of sour gas on line pipe apparently have been whipped by Russian engineers.

They are using asbestos-cement pipe on lines from Second Baku field.

Steel pipelines corroded within a year. Plastic pipe was out of the question. It wasn't available.

Russian researchers now are working on an improved asbestos-cement pipe capable of handling pressures up to 150 psia. Thickness and volumetric weight of the walls are about 20 per cent greater than similar water pipe used in Russia.

Tight money and the soft crude market are teaming to delay pipeline relief for distressed crude in southwestern Kansas and northwestern Oklahoma.

Southern Kansas Pipeline plans to build a 200-mile, 10,000-bbl. line from Meade County to Arkansas City, Kans. But a hearing on its application before the Kansas Corporation Commission has been postponed again.

Texas refiners stopped buying the crude April 1.

Exploration men have seen the Four Corners area become an oil giant in less than 2 years.

And it's still going strong.

With reserves already put at one-half billion barrels, daily production is expected to hit 110,000 bbl. daily by 1959. The present Aneth trend is 11 miles long and 4 miles wide. Geologists predict other trends will extend into Colorado, New Mexico, and Arizona.

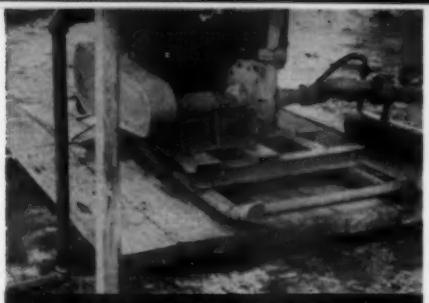
The outlook for this new oil province plus an analysis of why it's a major company play are given in a special Journal study on p. 83.

Exploration highlights: Pan American's 1-CS University in Pecos County, West Texas, is drilling below 20,050 ft., setting a new Texas depth record with every foot. It's still in shale believed to be the Barnett formation of the Mississippian. Goal is the Devonian... Magnolia's deep wildcat in Caddo County, Okla., is below 20,043 ft. and operator may take it down to 24,000 ft. That would make the 1 Sterba the world's deepest well. It already is the record holder for Oklahoma. The Sterba topped the Sycamore lime at 19,970 ft... Third Devonian discovery at Edith Lake in the highly promising Virginia Hills-Swan Hills region of west-central Alberta is adding fuel to a big play that may extend well into next year... Israeli wildcat 11 miles south of Heletz field has encountered gas. The gas ignited and burned for 24 hours before it was extinguished.

The air has now been cleared for merger of the 80,000-member International Chemical Workers union and larger O.C.A.W.

Negotiations on the merger will get under way soon.

Union, however, will need new techniques and financial strength to organize the 550,000 unorganized chemical workers. The chemical industry is a small-plant industry which will be expensive and slow to organize.



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IN THE NEWS

Processing:

Jet Age Revolutionizing Fuels 51
Premium-Grade Gasolines End Record Climb 61
Processing Briefs 65
After 5 Years, H-Oil Hydrogenation Ready for Work 71
Germans Set for Big Jump in Refinery Runs 80

Drilling and Exploration:

Oklahoma Depth-Record Breaker May Snare World Title 60
Texas' Deepest Hole May Stop at 21,000 Ft. 60
Wild Texas Gasser Tamed, Gets Emergency Completion 60
Giant Barge Ready for First Job 62
Salvaged Barges Will Return to Work 75
Cities Service, Conorado Dealing for Algerian Tracts 76
Creole Has Second Blowout at Lake Maracaibo Location 79
Guatemala Ready to Let New Concessions 79
Israeli Wildcat on Beeri License Hits Gas, Blows Out 80
Flank Play Holds Spotlight in Denver Basin 159
Many Fields Yet to Come, Geologist Says 161
Are We Entering Delaware Basin by the Back Door? 184

Production:

Double-Wall Liner Produces More Oil, Less Sand 55
Record Miscible-Phase Project Hits Full Stride 58
Texas Producers Seek New Law as Proration Fight Grows 61
Mississippi Also Has a Prolific Well 64
Alabama Law May Mean Water Flood in Citronelle 65

Pipelining:

Alberta Premier Signs Gas-Export Permit 62
Trans Mountain Completing 30-In. Loops on Crude Line 68
Gas Line Crosses Intracoastal Canal in 4 Hours 72
Pipeline Briefs 73
Russians Move Sour Gas Through Asbestos-Cement Pipe 79

General Interest:

Louisiana Issues First Ratable-Take Order 56
Imports Hearing Testing Rigidity of Controls 56
O.C.A.W., Chemical Union Talking Merger 57
U. S. Moves to Link All Gulf States to Boundary Case 68
Paradox Basin Fields Get New Names 75
Big-Inch Line from Iran to Turkey May Be Built 76
Middle East Pushes Free-World Output to New Mark in June 78

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TECHNOLOGY–OPERATION

Special Four Corners Section

From Dry-Hole Graveyard to Major Province **83-90**

By Norman S. Morrisey

The Utah portion of the Four Corners area has been transformed overnight into an oil province with upwards of 500 million barrels of undeveloped reserves. The Aneth trend has rapidly developed into a producing area 11 miles long and 4 miles wide with reserves conservatively estimated at 250,000,000 bbl. Here are the geology, basins, production, drilling costs, and future outlook.

Drilling-Production

G.W.'s Big Rig Flexes Its Muscles **93**

By Ed McGhee

Great Western Drilling Co.'s "shake down" of its new diesel-electric Rig 44 is on Phillips Petroleum Co. and Sinclair Oil & Gas Co.'s 1-A Montgomery which is scheduled to go 22,000 ft. Rig 44 operation is described and also Great Western's modification of its standard big-rig layout for this deep well.

How To Find True Resistivity From Three Normal Curves **107**

By Hubert Guyod and L. C. Kanner

This article gives a supplementary procedure for a chart which appeared in a series by Hamilton and Charrin in The Oil and Gas Journal on Log Analysis. The present article shows how to treat nonuniform formations, unreliable mud-resistivity values, and various hole diameters.

Field Processing—40: How To Calculate Flowing B.H.P. of Gas Wells **114**

By Dr. John M. Campbell

Refining-Processing

"Package" Concept Cuts Expansion Cost **97**

By T. Ben Arnold and Stephen Valentine

How Vickers Petroleum Co. increased by 50 per cent its T.C.C. capacity at the Potwin, Kans., refinery at a moderate cost. Most of the work was done while the unit was on stream.

New Gasoline Plant Processes Gas From 14 Texas Pools **100**

By R. J. Brosamer and C. G. Eaheart

This deals with Phillips Petroleum Co.'s Andrews, Tex., natural-gasoline plant. Gas is gathered by Means booster station on the north and Emma booster station on the south. Plant design is for average gas handling volume of 80 M.M.s.c.f.d.

Bauxite Treaters Save for D-X Sunray **103**

By V. L. Brant

In D-X Sunray's sulfuric acid alkylation plant at its Tulsa refinery bauxite filters have replaced caustic-wash facilities. The bauxite treating system has been used successfully for 2½ years. Total savings amount to $258 per day in operating and maintenance and an additional $600 to $700 when the total alkylate is used in a motor blend.

The Foreman's Page **119**

Questions on Technology **123**

General

Better Management: Tips on Memo and Report Writing **129**

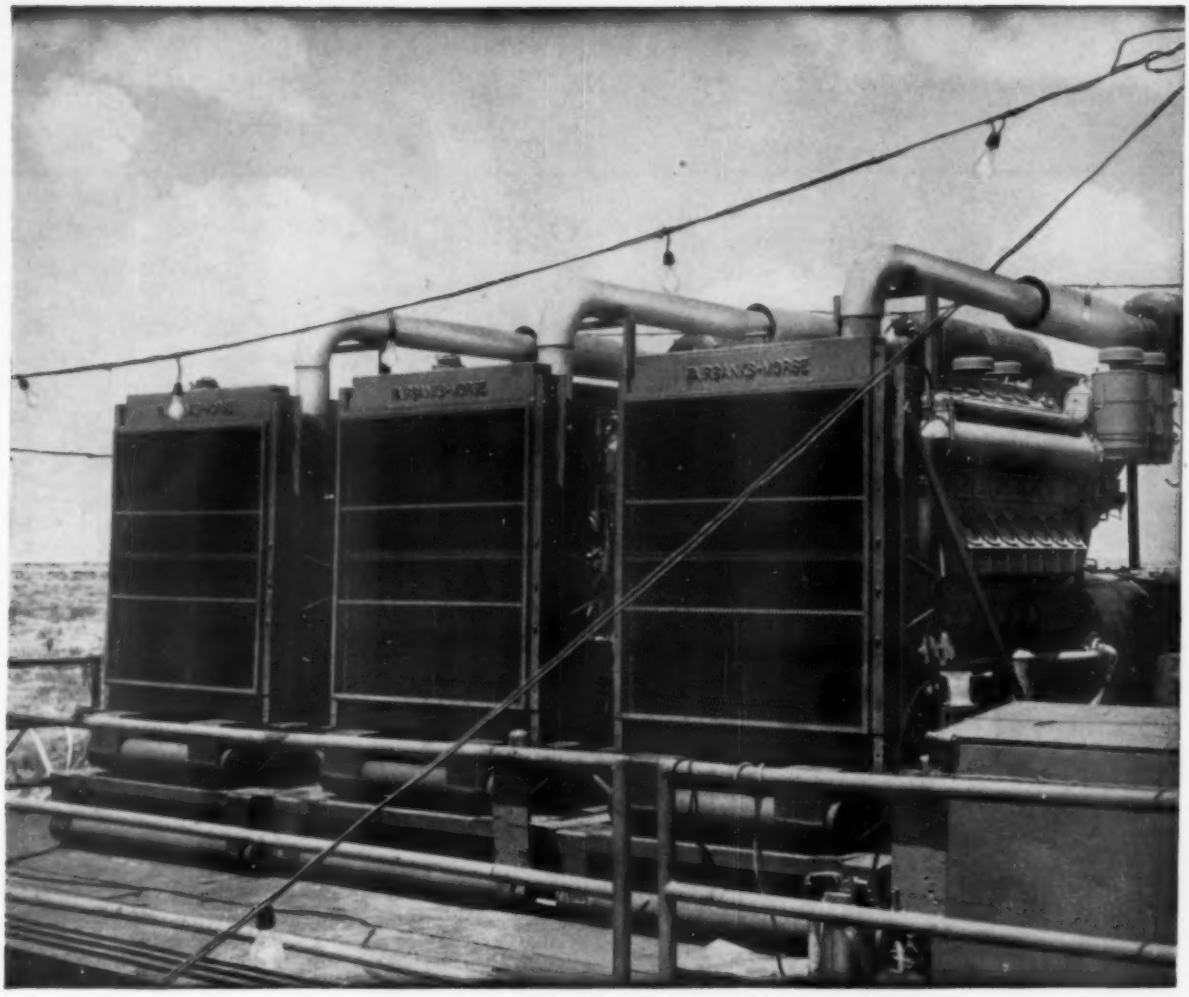
Pipeline Patrol: Operations **135**

By E. T. Bowers

Texas Gas Transmission microfilms voluminous records for economical filing. Two cabinets save 160 four-drawer files.

DEPARTMENTS

They Say	41	Questions on Technology	123	Statistical Summary	194
Calendar of Events	42	Field Processing	127	Drilling Statistics	195
Journally Speaking	47	Pipeline Patrol	135	Supply Statistics	196
Editorial	49	Drilling Contractors	140	Refining Statistics	197
Watching Washington	57	New Equipment	143	Markets	198
International News	76	Equipment Men in News	150	Selected Monthly Data	199
Books	117	Exploration Highlights	159	Classified Advertising	201
Foreman's Page	119	Personals	191	Advertisers' Index	205



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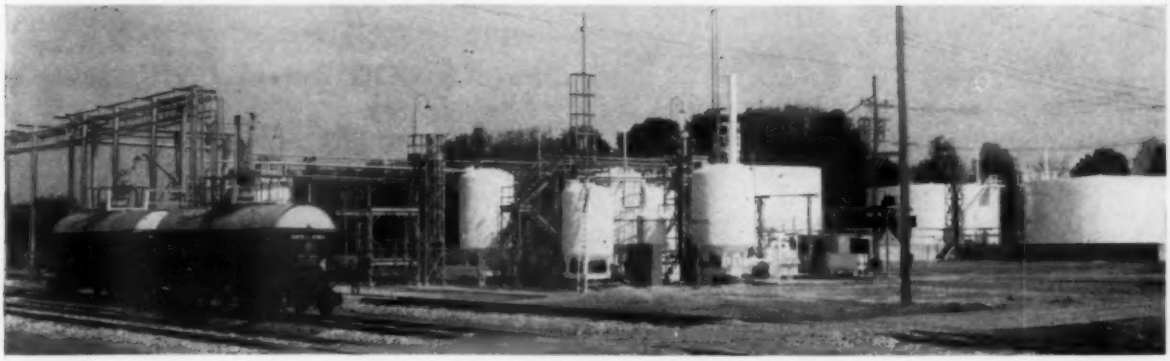
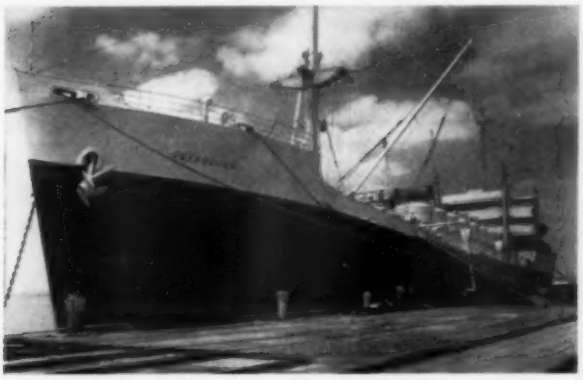


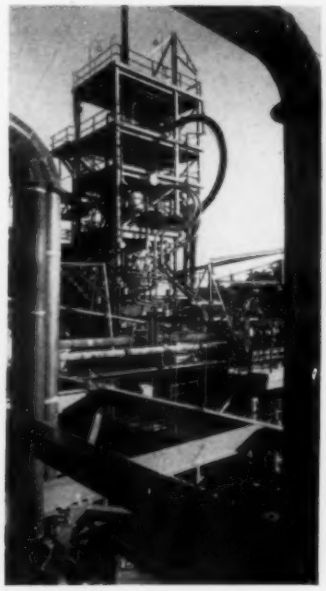
HERE IS the new Du Pont tetraethyl lead terminal at Beaumont, Texas. This latest addition to the rapidly expanding facilities insures an ample nearby supply, and prompt filling of orders from Gulf Coast refiners. The terminal contains complete modern equipment for storage and handling, and rapid dispatch of loaded TEL tank cars. The new terminal will be kept amply supplied with TEL by tank ship from the Du Pont manufacturing plant at Deepwater, New Jersey.

Three major expansions of Du Pont TEL facilities—already completed in 1957

Already this year Du Pont has opened a large new storage terminal, commissioned a new ship and opened a new manufacturing plant.

MV PETROCHEM, first ship to transport TEL compound in bulk, is another major addition to Du Pont's setup for delivering tetraethyl lead. Built primarily to supply the Beaumont TEL terminal, she is also equipped for transporting ethyl chloride and ethylene dichloride on northbound sailings. For maximum safety, the 6,000-ton tank ship is permanently compartmented, with solid bulkheads dividing the operational and cargo sections.





THIS NEW DU PONT TEL manufacturing plant at Antioch, California, was completed by Du Pont early this year. It was constructed to meet the needs of the fast-growing West Coast refining industry. Incorporating the most modern TEL manufacturing facilities in the world, it makes possible fast, short-distance shipments of California-made TEL to all West Coast refineries.

THESE THREE major expansions will increase even more the efficiency of the nationwide network of Du Pont TEL facilities. They complement the Chambers Works TEL manufacturing plant, the Du Pont Petroleum Laboratory, the five regional Petroleum Chemicals laboratories, the conveniently located rail sidings with loaded tank cars in 14 major refining areas, and the 12 sales-service offices. Like the wide range of services—technical, marketing, research, safety and operational—offered by Du Pont, the purpose of these installations is to help you get the most out of our additives program.

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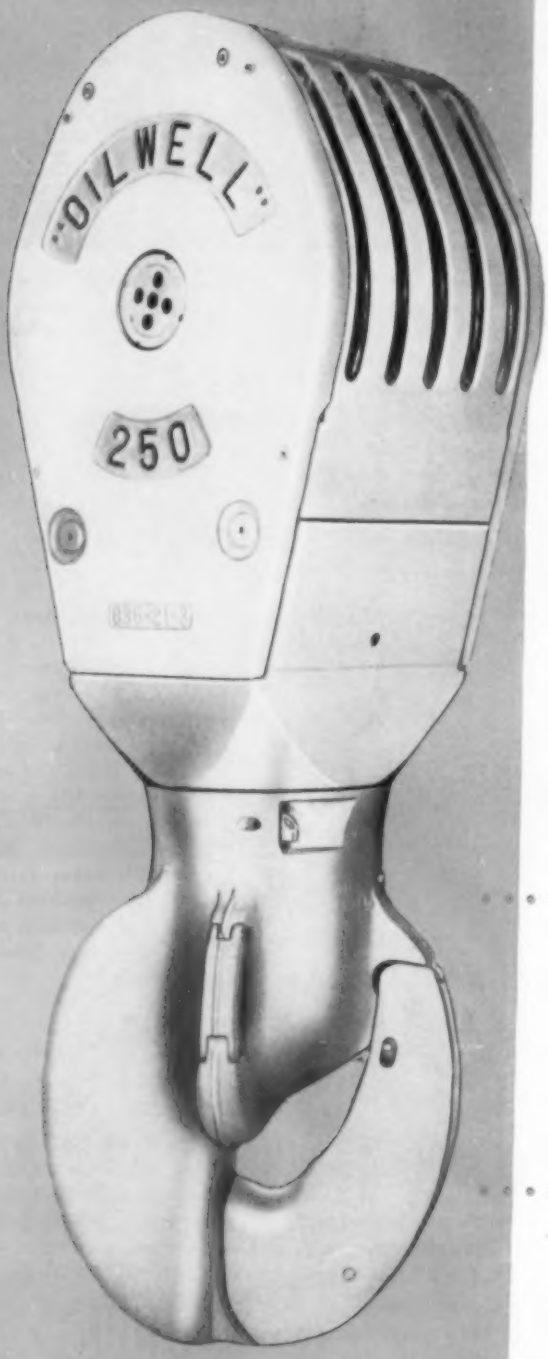

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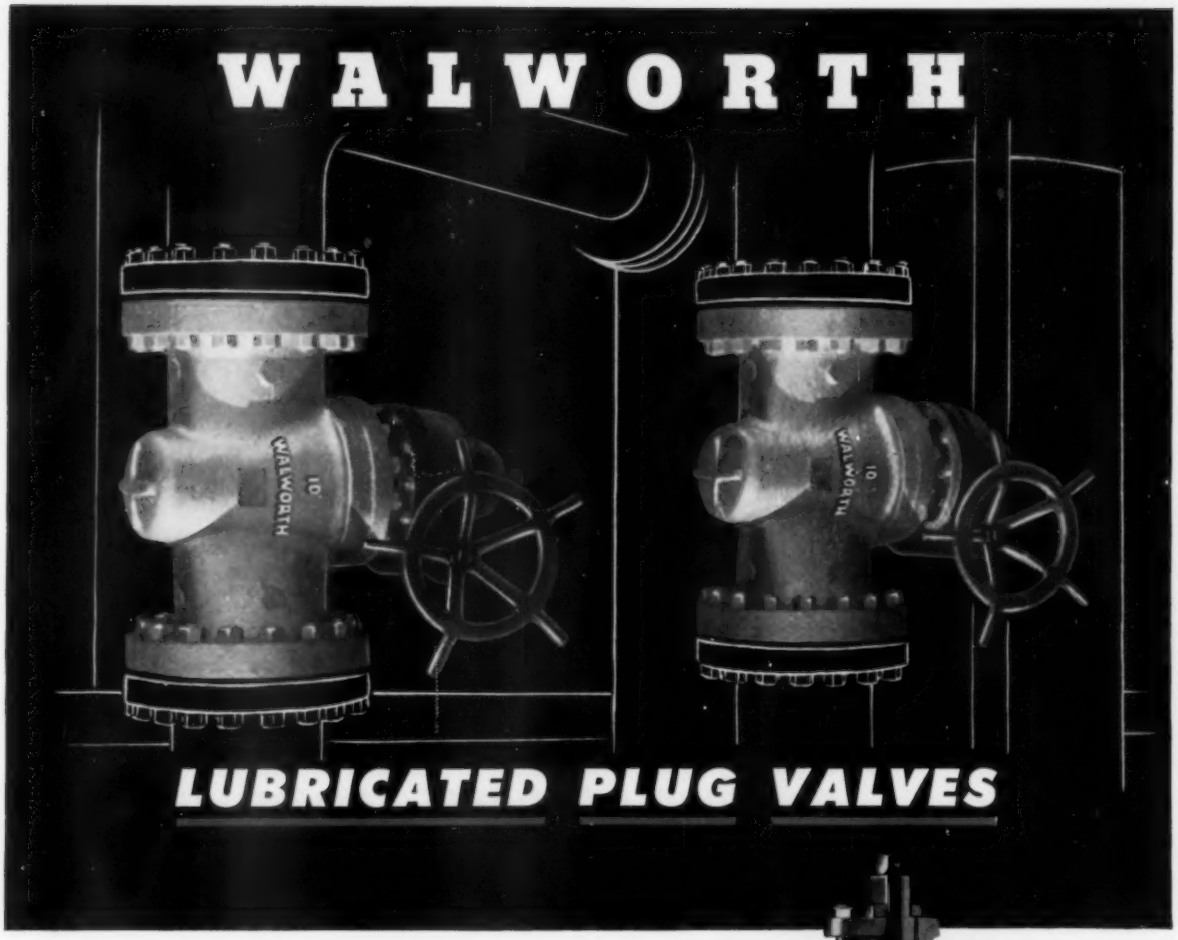
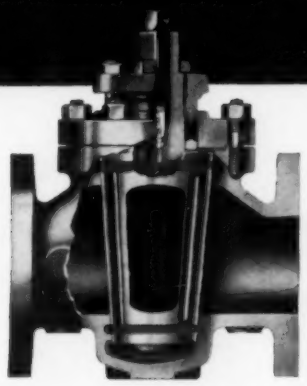


LUBRICATED PLUG VALVES

Better because ... They are *pressure sealed* with an insoluble lubricant readily renewed while the valve is in service. Lubricant completely surrounds the plug ports assuring a tight seal against leaks. It also insures ease of operation by reducing friction between the body and the plug while at the same time protecting the finished surfaces against corrosion and wear.



Lubricant system of a Walworth No. 1700F Regular Gland, Wrench Operated, Steel-iron, *Lubricated Plug* Valve. Other Walworth *Lubricated Plug* Valves include Single Gland, and Ball Bearing types. Sizes to 30-inches — pressures to 5,000 psi, and for vacuum service.

Walworth Lubricated Plug Valves are the most satisfactory valves available for the handling of gritty suspensions, and many other destructive, erosive, and corrosive industrial and chemical solutions.

They are ideal for general refinery and pipeline service.

FOR COMPLETE INFORMATION, SEE YOUR WALWORTH DISTRIBUTOR OR WRITE FOR ILLUSTRATED CIRCULAR

WALWORTH

60 East 42nd Street, New York 17, New York

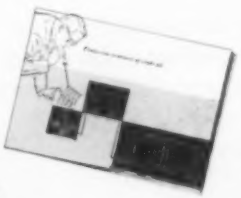
SUBSIDIARIES: ALOYCO ALLOY STEEL PRODUCTS CO. CONOFLOW CORPORATION MH M & H VALVE & FITTINGS CO. SW SOUTHWEST FABRICATING & WELDING CO., INC. WALWORTH COMPANY OF CANADA, LTD.

Dehydration costs less when Aquaness serves you

You can be sure of effective demulsification—with minimum chemical costs, and higher gravity of oil from the treater—when you've got Aquaness working for you.

Thorough service by Aquaness is the difference. The Aquaness field man who comes to your lease stays with the job until he's sure he's found the best way to solve your particular problem. He brings with him a lot of experience, learned the hard way—by years of work in the oil fields. And he has a complete line of uniform, high quality chemicals to match the requirements of your emulsion. And when he finds the best chemical, he checks and re-checks to determine the minimum amount that will give you treating to pipeline specifications.

Extra service by Aquaness can uncover extra profits for you. Call your local Aquaness Representative today.



Write for the Aquaness Booklet, "Production Treatment of Crude Oil."

For Blanketing Fire in Chemicals, Gasoline, Oils

These pictures were taken at Robins Air Force Base in Georgia during acceptance tests of a Grinnell ProtectoFoam System. Above, a man slogs through foam to check the spray pattern produced by over 800 nozzles discharging 75,000 gallons of foam per minute.

With a ProtectoFoam system, a vapor tight blanket of foam floats on liquids and clings to solids, extinguishing flames and preventing re-ignition. It is particularly effective against fires in gasoline, oils, and chemicals.

The foam, a harmless mixture of water and a protein base foaming agent, is produced mechanically by special Grinnell nozzles. When the foam compound has been used up or shut off, these nozzles then discharge water in the same manner as standard open sprinklers. Once the fire is out, the water discharge may be used to wash down the building and equipment and clean away the foam.

ProtectoFoam is only one of many Grinnell Fire Protection Systems designed for special hazard application. For unbiased advice on your fire protection problems, write to Grinnell Company, Inc., 256 West Exchange Street, Providence, Rhode Island.

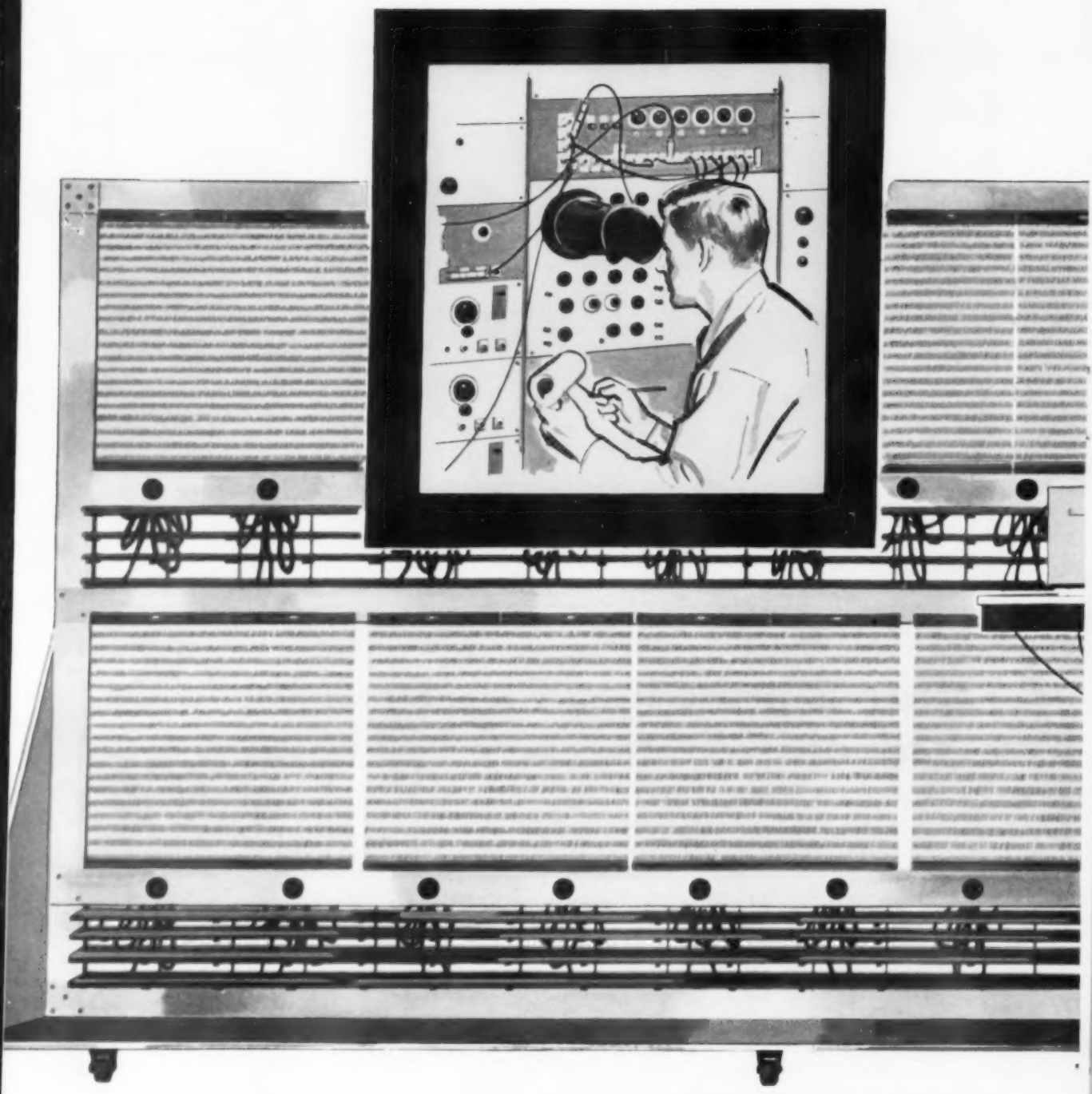
Foam flows under aircraft to form a complete blanket.

Truck breasts hub-deep foam blanket outside hangar. Foam will dry out and disintegrate to a powder.

GRINNELL

WHENEVER FIRE PROTECTION IS INVOLVED

Manufacturing, Engineering, and Installation of Fire Protection Systems since 1870



50,000 RESISTORS . . . . . "a researcher's oil well"

Rather surprising to think that formation characteristics can be duplicated in the laboratory, yet, it's done every day. A network of 50,000 resistors, in various combinations, is used to simulate bore hole parameters which affect resistivity measurements. All resistivity logs—including normals, laterals, micrologs, microlaterologs, and laterologs—can be studied.

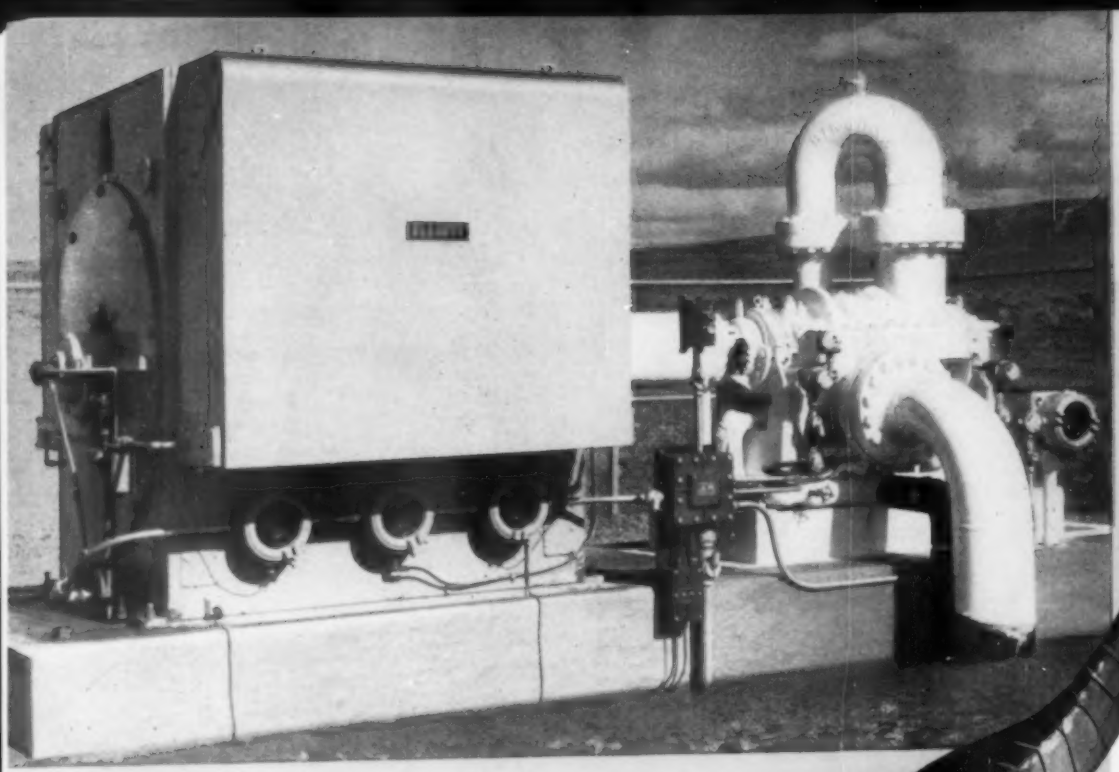
Such research techniques have made it easier for you to find oil and gas.

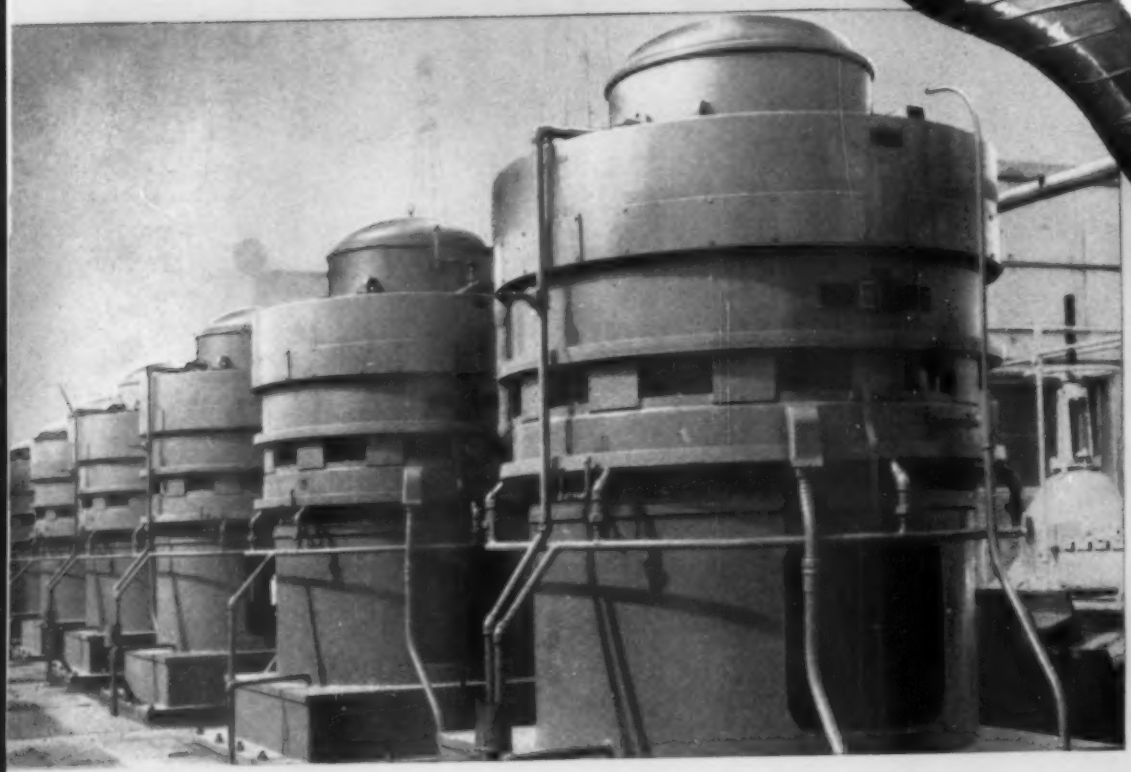
From Schlumberger's Research Center, located at Ridgefield, Connecticut, have come the logging devices, the advanced interpretation methods, the applications of physics to geology . . . all for better definition of oil and gas reservoirs.

At Ridgefield, laboratory experience is combined with field know-how to find the solutions to oil exploration problems. Through research, the answers to what might be needed in the future will be provided. They may be in the form of new tools, refinements of present tools, or new analysis methods.

The answers will come to you from Schlumberger.

SCHLUMBERGER . . . Engineering for Better Service





ELLIOTT Company

Ridgway Division, Ridgway, Penna.

in 1,900,000 HP of squirrel-cage induction motors . . .

not one insulation failure in 8 years with ELLIOTT

ELLIOTT Fabri-Seal INSULATION

Fabri-Seal insulation

The most astounding record of large motor dependability is this 8-year uninterrupted service of Elliott motors with Fabri-Seal insulation!

To achieve this, Elliott engineers devoted over ten years of intensive research and laboratory testing to create the Elliott Fabri-Seal insulation system for large induction motors. The finest insulating materials were meticulously selected and tested. Years of experimentation went into the development of improved methods of coil fabricating—such as exacting application by hand-wrapping critical areas and sealing the most vulnerable points. The objective was to achieve a coil insulating system—superior in every detail—to withstand severe temperatures, moisture and chemical fumes and assure long trouble-free life.

Since 1948, 1,900,000 hp of large squirrel-cage induction motors with Fabri-Seal coil insulation have been put into actual field service. The result was unprecedented. In eight years, *not one Elliott large induction motor stator coil has failed due to insulation breakdown.*

What's more, 700,000 hp of these were Elliott weather-protected motors (similar to installations seen here). And, although these machines are operating in rigorous outdoor applications in extremes of humidity, rain, snow, sleet, hurricanes, desert heat, oil fumes and salt spray—*not one of them in 8 years*—has failed due to faulty insulation.

R7-26

Elliott's outstanding Fabri-Seal insulation "field-proven" for over 8 years . . . shatters all previous service records!

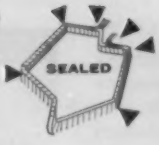
IMMERSION "TORTURE-TEST"

quickly locates potential trouble-spots. It has been vitally important in the perfection of Elliott Fabri-Seal insulation.

MYLAR®-BACKED MICA WRAPPER

—hand-wrapped around all stator coil slot sections—proven ability to withstand severe temperature and age.

®Dupont trademark

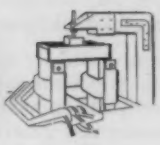


SEALED AT VULNERABLE POINTS

Prevents entrance of moisture or contaminants which commonly cause failure in conventional insulating systems.

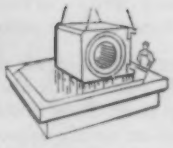
VACUUM AND PRESSURE IMPREGNATION

Air and moisture are removed, then moisture- and acid-resistant insulating varnish penetrates coils.



TURN-TO-TURN TESTED

Subjects each turn to high surge voltage many times greater than normally imposed in actual field service.



EVERY STATOR COMPLETELY IMMERSED

In special, flexible varnish, then baked. Coil end-turns, leads and joints given two more dips and bakes.

Weeds are a hazard you can't afford!

Destroy them with Baron, Radapon and other Dow products

The weeds around this tank farm aren't costing one single penny—*as long as they're not burning*. But a spark and a gust of wind could transform this tank farm into a tragic inferno!

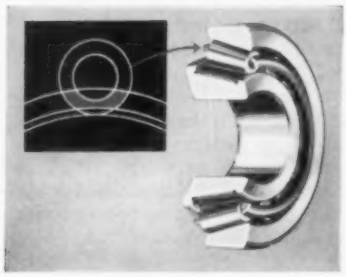
Fire is the biggest threat posed by weeds, but it's not the only one. Weeds also hide poisonous plants and objects to trip over. They obscure vision around security fences, present an untidy appearance and generally cause a nuisance around tanks, pipelines, wells and plants.

Get rid of vegetation hazards with Baron®, Radapon® and other Dow products. Your own men can do this job, or professional contractors will assume full responsibility. Let us send you more information and the name of a qualified distributor near you.

Write for free new booklets on industrial vegetation control. THE DOW CHEMICAL COMPANY, Agricultural Sales Dept., Midland, Michigan.

YOU CAN DEPEND ON DOW

Built to stand up . . . under 'round-the-clock pressure!



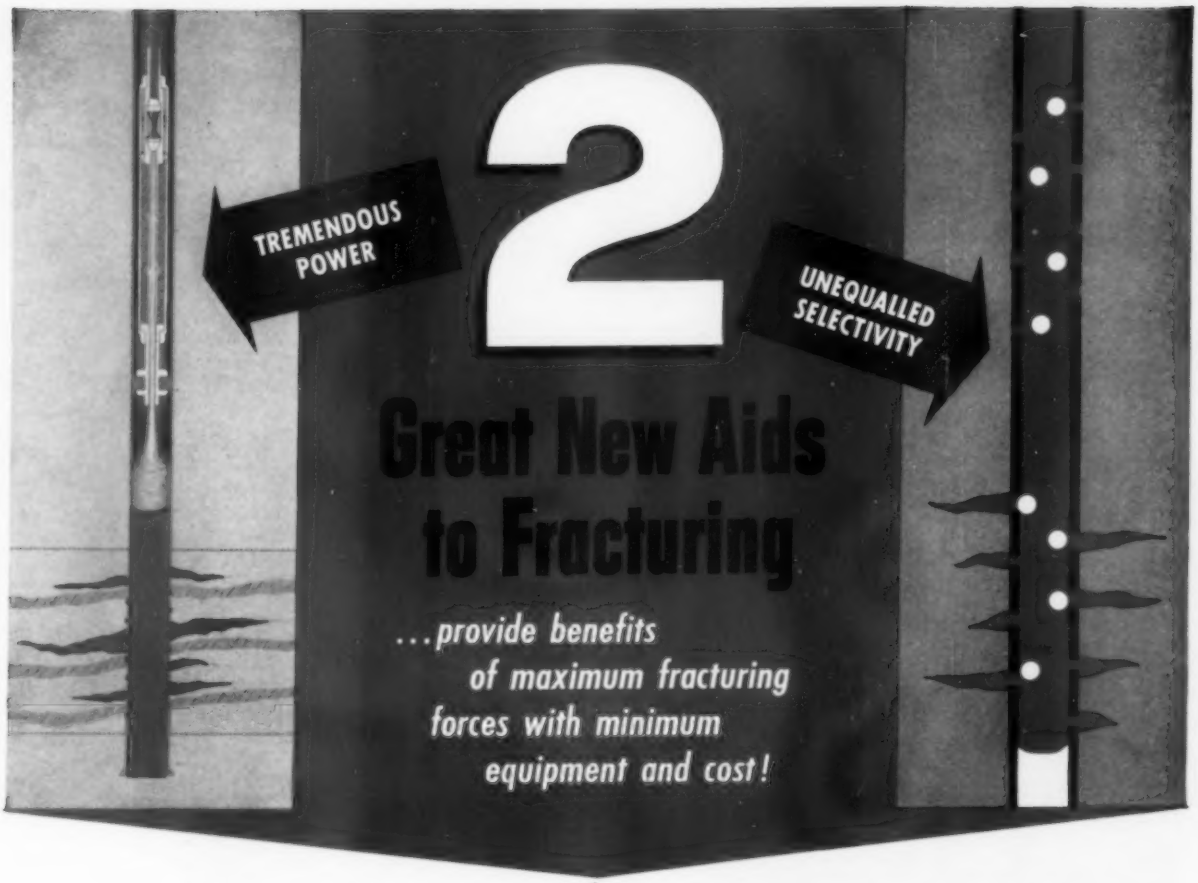
HIGHER FLANGE IMPROVES ROLLER ALIGNMENT

As shown by the gray area above, the higher flange provides a large two-zone contact area for the roller heads. This greatly reduces wear—practically eliminates "end play". Larger oil groove provides positive lubrication.

The flow of America's vital oil can't be regulated by a time clock! These bobbing pumps work around the clock, around the year—with virtually no attention whatever! Dependable Bower Roller Bearings are more than proving their ability to stand this back-breaking pace—doing it with a minimum of maintenance cost and down-time. That's because important Bower Spher-O-Honed design features, like the one shown at left, have reduced bearing failure to a rarity. Whatever test *you* put them to—tractors, machine tools, jet engines—you'll find that Bower Spher-O-Honed Bearings will last longer and operate more efficiently. Let a Bower engineer show you the many advanced design features and superior quality of the complete Bower line. There are tapered, straight and journal roller bearings for every field of transportation and industry.

BOWER ROLLER BEARING DIVISION
FEDERAL-MOGUL-BOWER BEARINGS, INC. • DETROIT 14, MICHIGAN

BOWER ROLLER BEARINGS


TREMENDOUS POWER
2
UNEQUALLED SELECTIVITY
Great New Aids to Fracturing
...provide benefits of maximum fracturing forces with minimum equipment and cost!

FRAC-ASSIST TOOL

gives 5000 hydraulic horsepower "down-hole" boost to surface-pumped fracturing fluid.

Frac-Assist initiates and *assists* the fracturing operation by generating a super fracturing power *right at the desired zone*. Little energy is lost to friction. You get the benefit of high injection rates throughout the zone at high pressure ...with minimum fluid loss. Frac-Assist creates multiple highly productive fractures... which are maintained and extended by the normal fluid flow that immediately follows. Frac-Assist is recommended when high injection rates are desired in down tubing jobs.

SELECT-O-BALL SERVICE

controls fracturing fluid to permit treatment of all intervals in one stage.

Select-O-Ball Service opens drainage channels that cannot be penetrated otherwise... provides penetration of fluid into a maximum number of productive intervals with minimum equipment. These free-floating balls—injected into the frac fluid stream—selectively shut off perforations opposite more permeable zones as they are treated... progressively concentrate fluid under greater pressures on tighter zones ... until full treatment is achieved.

NOTE: Select-O-Ball Service is equally effective for acidizing treatments.

Write for full details TODAY.

CHEMICAL PROCESS BJ Service

SUBSIDIARY OF BORG-WARNER CORP.

BJ SERVICE, INC.

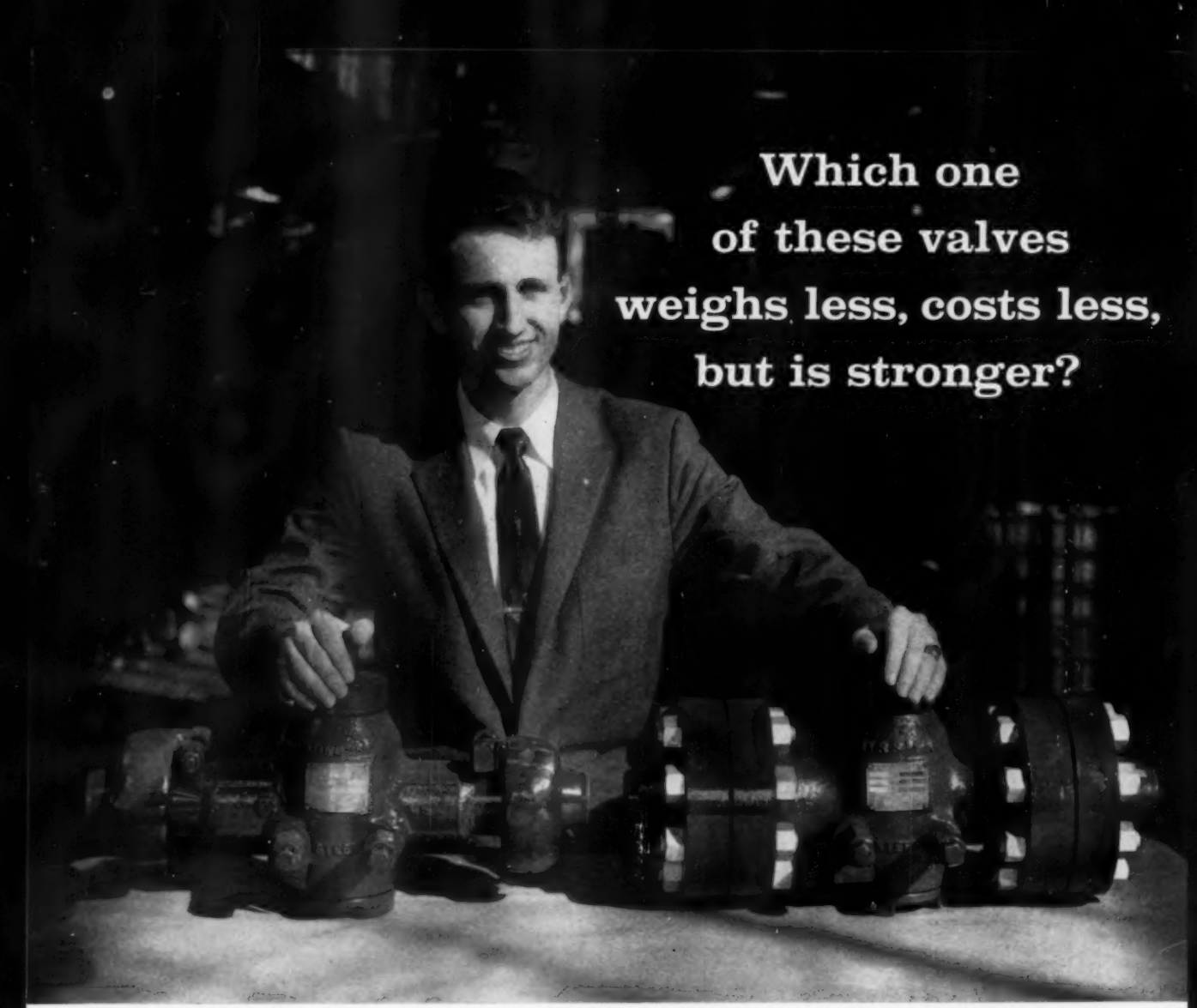
General Offices and Laboratory—Long Beach, California

Stations Throughout California, Rocky Mountain and Permian Basin Areas

Chemical Process

General Offices and Laboratory—Breckenridge, Texas

Stations Throughout the Mid-Continent Area



Both of these valves are of the same make, model, size, and pressure rating. One is equipped with 2″, 6000 lbs. test, Unibolt Couplings, the other with 2″, Series 900 flanges. The Unibolt-equipped valve weighs 102 lbs. less, costs about 10% less, and is approximately 28% stronger!

And the advantages don't stop there. Because it weighs less, the Unibolt-equipped valve costs less to ship and is easier to handle, easier to install. (Two bolts and nuts, compared to 16 bolts and 32 nuts.)

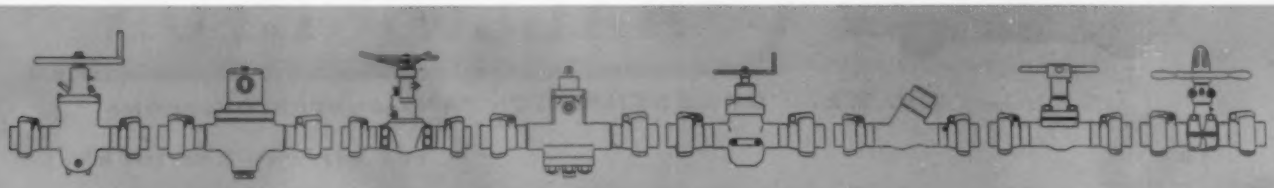
Unibolt Couplings are easy to attach to any valve. Either hub of the Coupling may be butt-welded, socket-welded or screwed to the valve body.

Even if steel were plentiful, Unibolt-equipped valves—as opposed to flanged valves—would be your best buy.

THORNHILL CRAVER CO.

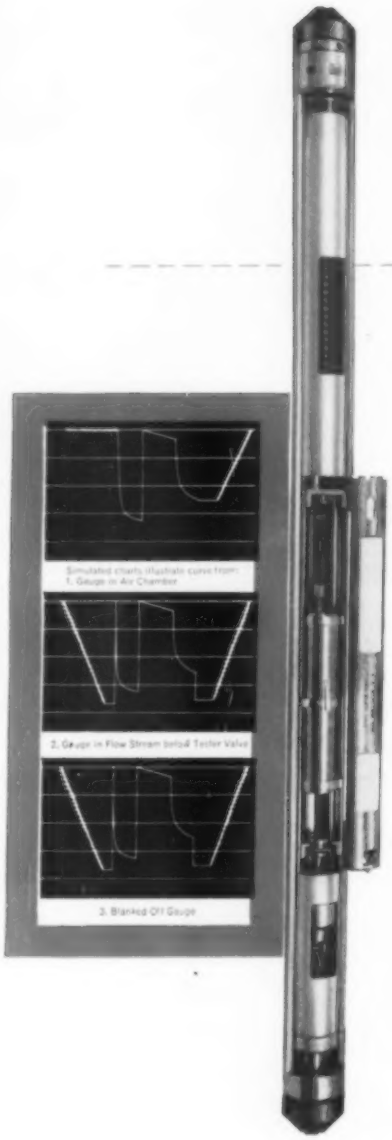
P. O. Box 1184, Houston, Texas

ask your supplier to furnish unibolt-equipped valves



HALLIBURTON'S *dual CIP technique*

FURNISHES HELPFUL DAMAGE RATIO INFORMATION


Simulated charts illustrate curve from:
1. Gauge in Air Chamber
2. Gauge in Flow Stream below Tester Valve
3. Blanked Off Gauge

Developed from the accuracy and sensitivity of Halliburton's Bourdon Tube Gauge, dual closed-in-pressure testing procedure provides both initial and final CIP data for the calculation of damage ratio, helpful in making a more accurate reservoir evaluation.

Damage ratio may be defined as the ratio between the theoretical and the actual productivity index of the well at the time of measurement. For example, if the damage ratio of the well is 4, the well should be able to produce at least four times as much fluid after the damage or skin surrounding the well bore has been removed. In other words, the well needs to be open four times as long (in this example) to recover the same amount of fluid had no damage occurred. Through the use of such damage ratio information, it may be desirable, in numerous cases, to retest the formation to avoid the possibility of passing up a potentially productive zone.

Why miss a pay zone in *your* well? Get the best in drill stem testing. Consult with your Halliburton tester today.

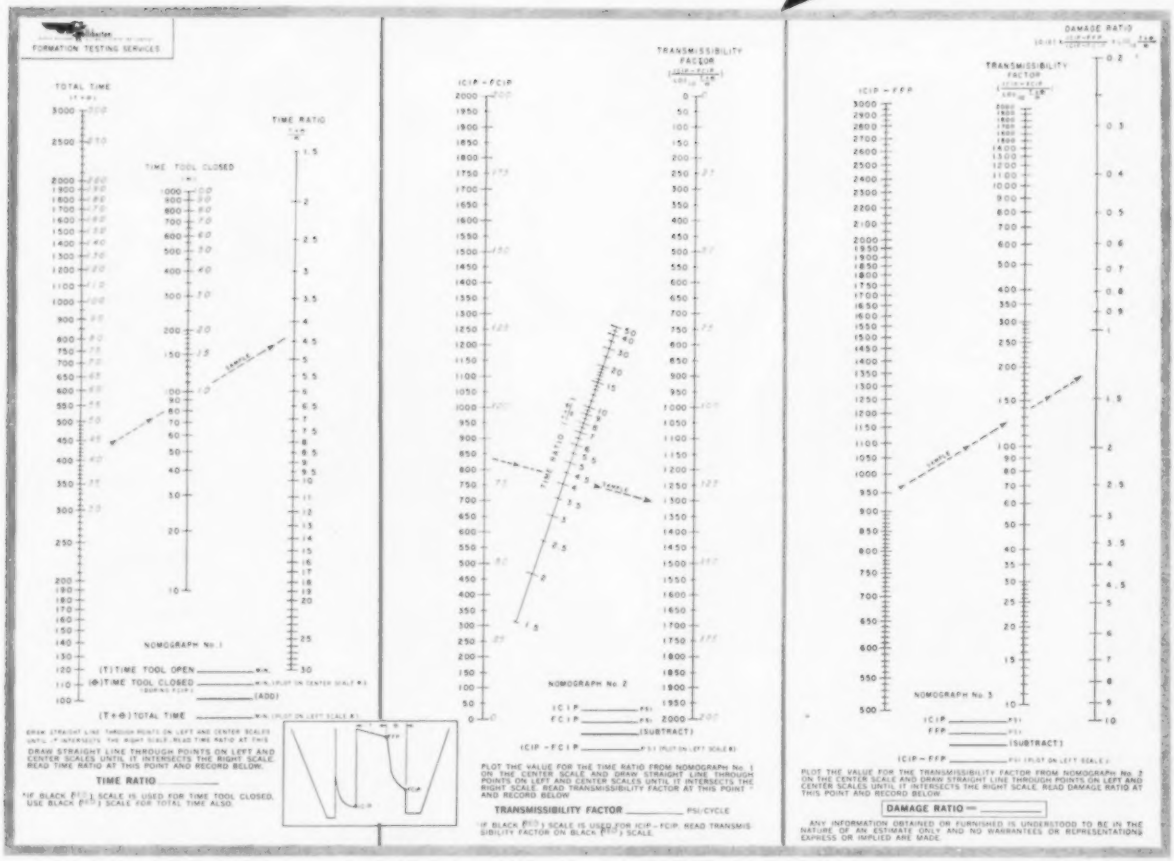
HALLIBURTON

OIL WELL CEMENTING COMPANY DUNCAN, OKLAHOMA

helps you to better well evaluation...

DAMAGE RATIO COMPUTED FROM DUAL CIP READINGS

and these three nomographs:



Although damage ratio must necessarily be an approximation, the data gained may result in a different evaluation of the tested interval and warrant a change in the drilling schedule or completion procedure for greater productivity.

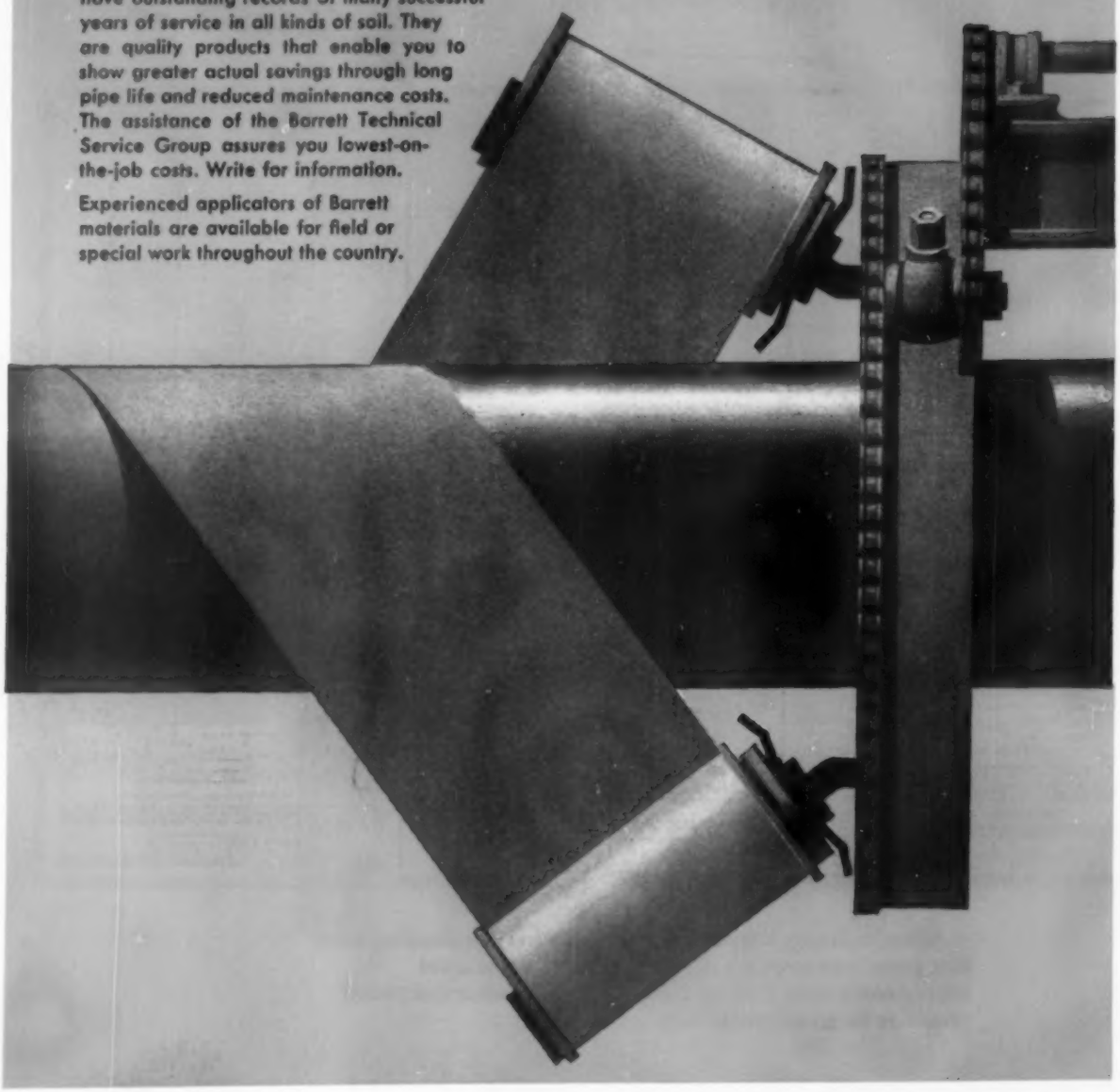
TESTING SERVICE

TESTING RESULTS YOU CAN TRUST

WRAPPING IT UP

Barrett Protective Coatings wrap up your pipe protection problem at lowest cost. Barrett Primer, Coal-Tar Enamel and Pipeline Felt have outstanding records of many successful years of service in all kinds of soil. They are quality products that enable you to show greater actual savings through long pipe life and reduced maintenance costs. The assistance of the Barrett Technical Service Group assures you lowest-on-the-job costs. Write for information.

Experienced applicators of Barrett materials are available for field or special work throughout the country.



Barrett®

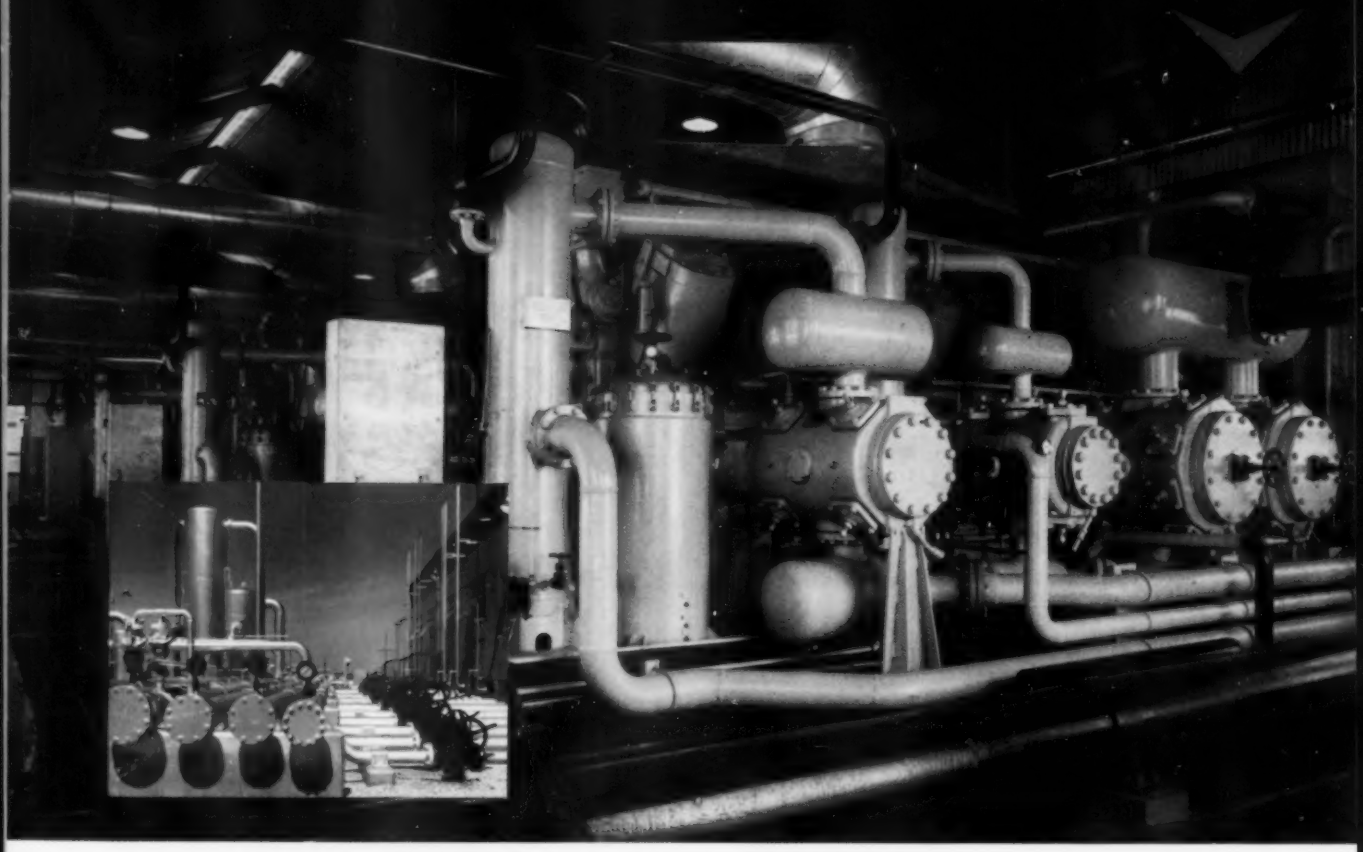
PROTECTIVE COATINGS

BARRETT DIVISION, Allied Chemical & Dye Corporation, 40 Rector Street, New York 6, N. Y. In Canada: The Barrett Company, Ltd., 5551 St. Hubert Street, Montreal, P. Q.

Allied Chemical

OVER 100 YEARS OF EXPERIENCE

BEAIRD-INGERSOLL-RAND Packaged Compressor Plant



REEF FIELDS GASOLINE CORPORATION'S Good Field Compressor Station—equipped with five Beaird-Ingersoll-Rand 660 h.p. 12SVG packaged compressors . . . Young radiators and all necessary controls. Other sizes 120 to 660 h.p.

Boost Gas . . .

PACKAGED COMPRESSORS HANDLE 278 SPRAYBERRY WELLS

Reef Fields Gasoline Corporation built the Good Field Compressor station to boost separator gas from low pressure wells to a natural gasoline plant sixteen miles away. Originally planned to handle Good Canyon Reef Field, the station has now been expanded to gather gas from the Jo-Mill Sprayberry Field. Five Beaird-Ingersoll-Rand 12SVG 660 h.p. packaged compressors have been installed to handle this increased load.

Picking up from the wells at 3 psig. the units boost the gas through three stages of compression to discharge at 600 psig. At present 278 wells are tied into the station which has a total volume of 18,000 MCF per day. Of this capacity, the five Beaird units recently added, are handling 12,000 MCF per day.

Packaged compressors were selected for the Good Field Station as total compressor requirements cannot be determined until the Sprayberry field is fully developed. Also the field is expected to have a relatively short life. As production tapers off, the units can be moved one at a time with little or no change to other service. The remaining units can be kept fully loaded in this manner until the field is depleted.

Let us give you all the facts about the economy of installing multiple Beaird-Ingersoll-Rand packaged compressor plants.

THE J. B. BEAIRD COMPANY, INC.
Shreveport, Louisiana
A subsidiary of American Machine & Foundry Company

BEAIRD
another AMF product
PACKAGED COMPRESSOR PLANTS

LOWEST COST PER HORSEPOWER INSTALLED

SHREVEPORT, LOUISIANA • *Sales Offices: Dallas, Houston, Corpus Christi and Midland, Texas • New Orleans, Louisiana • Tulsa, Oklahoma • Denver, Colorado Los Angeles, California • Caracas, Venezuela, and Cie. Ingersoll-Rand, Paris, France.*

Clear proof you can prevent plugging caused by iron in injection water!
CITRIC ACID ADDED
In this glass, only 10 ppm of Pfizer Citric Acid has been added to brine containing 2 ppm iron
NO CITRIC ACID
The brine in this glass also contains 2 ppm iron. But no citric has been added

● The cloudiness of the brine at right is caused by insoluble iron salts. Continuous injection of this water in secondary recovery causes plugging at the interface.

As you can see from the picture on the left above, Pfizer Citric Acid keeps the iron in your injection water from precipitating out...and thus piling up deposits at the interface.

Net result: Regular use of Pfizer Citric Acid will keep your injection rates high easily and economically. Also cuts down the frequency of expensive acidizing.

Pound for pound, citric acid sequesters iron better and at less cost than any other agent. High calcium and magnesium waters will not interfere with citric's iron-sequestering ability.

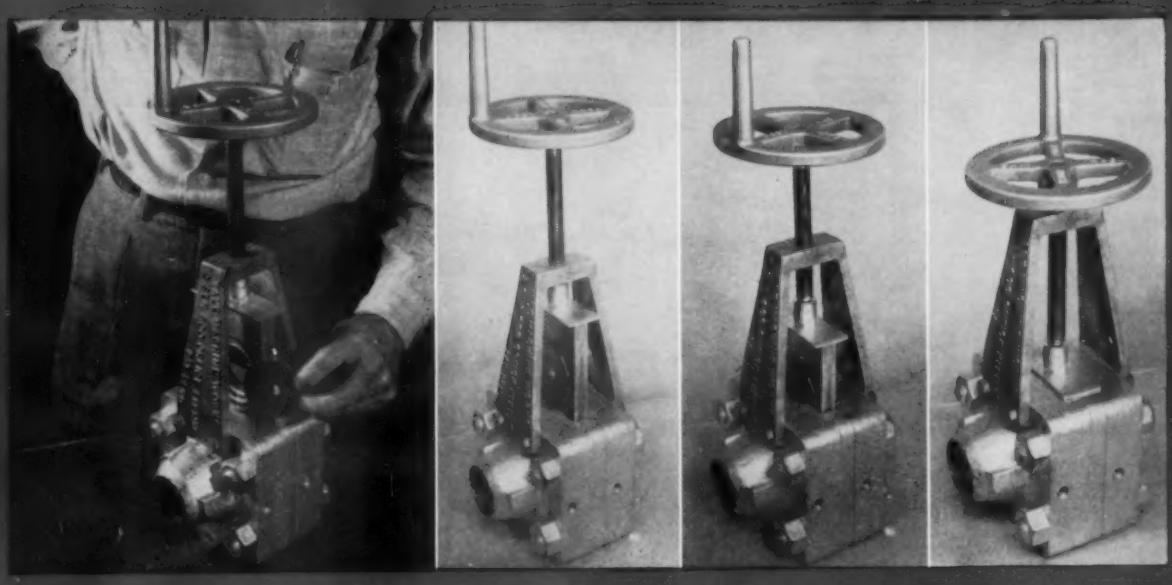
Nontoxic, safe to handle—Pfizer Citric Acid is excellent preventive medicine—whether for secondary recovery or pressure maintenance work. Pfizer supplies huge amounts of citric acid for a multitude of industrial uses throughout the world. This broad distribution pattern assures you of receiving all the citric you need without delay. (Just recently, Pfizer has opened a new warehouse in Dallas to serve the Southwest.)

For further information on preventing injection well plugging with Pfizer Citric Acid write to:

Manufacturing Chemists for Over 100 Years

Pfizer

CHAS. PFIZER & CO., INC.
Chemical Sales Division
630 Flushing Ave., Brooklyn 6, N. Y.
Branch Offices: Chicago, Ill.; San Francisco, Calif.; Vernon, Calif.; Atlanta, Ga.; Dallas, Texas



HOW EASY CAN IT BE . . .
to change an Orifice Plate?

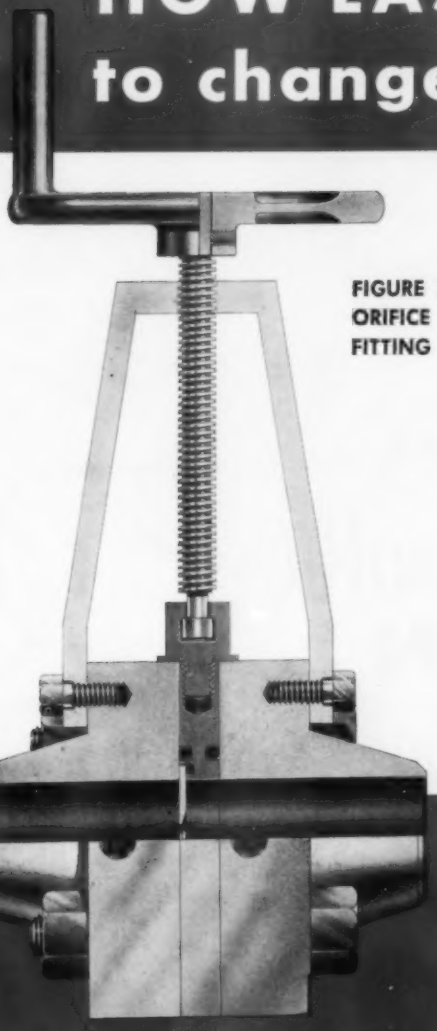


FIGURE 1000
ORIFICE
FITTING

With the Figure 1000 Orifice Fitting, changing a plate is as easy . . . and as simple . . . as opening and closing a gate valve. You need no wrenches, no hammers, no flange spreaders. You merely retract the carrier with the handwheel, lift out the old plate, insert the new one, and screw the carrier back into the body.* The plate is held securely in the recessed carrier without bolts, screws or other fittings . . . is pressure-sealed by an O-Ring . . . and positioned exactly in the center of the flow stream by a positive stop on the carrier. Pressure taps are in accordance with accepted standards.

Figure 1000 Orifice Fittings are furnished in 2", 3" and 4" sizes, 4000 psi and 6000 psi test pressure, threaded, flanged or welding-neck ends. Buy them through your supply store . . . use them for maximum convenience, speed and safety.

***Release pressure from line before retracting.**

YALE MACHINE WORKS
BOX 10117 • HOUSTON, TEXAS

Distributed by YALE SALES COMPANY
P. O. Box 10192 • Houston, Texas • Telephone ME 5-6418

Send me another
LUFKIN...
they give us the best service!

Lufkin **FOUNDRY & MACHINE COMPANY**
LUFKIN, TEXAS

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Lufkin equipment in Canada is handled by
THE LUFKIN MACHINE CO., LTD., 9950 65th Avenue, Edmonton, Alberta, Canada, Regina, Saskatchewan, Canada

STOP JET EROSION ON TUBING
with GUIBERSON'S

TUBING PROTECTOR RUBBERS

Protect that joint of tubing opposite casing perforations from jet stream impingement with Guiberson rubbers. Tough and resilient, they absorb the jet stream energy that erodes away steel tubing.

Compression molded from a special compound developed in Guiberson's Rubber Laboratory, these extra-dense rubbers have highest resistance to live oil and gas .. excessive bottom hole temperatures. At the same time, they eliminate cutting and abrasion by sand.

Self-aligning, interlocking design completely covers tubing and speeds up installation (no exposed gaps). We field install them at no extra cost to stay put on 2" or 2½" tubing. They snap into place under light tension.

Independent laboratory tests, made under the severest sand and live oil jetting conditions, show Guiberson tubing protector rubbers out-perform and far outlast other coatings .. such as lead, plastics and hard metal. Guiberson tubing protector rubbers not only save tubing, but may save a pulling job.

INTERLOCKING TYPE

SAFE THAN SORRY — BETTER BE — GUIBERSON

THE
GUIBERSON
CORPORATION

ESTABLISHED 1919
DALLAS, TEXAS
U. S. A.

ONE OF THE DRESSER INDUSTRIES

Sold by
Oil Field Supply Stores
Everywhere

Guiberson's overlapping type tubing protector rubbers are available in 2" and 2½" tubing sizes. The 2" size is designed to pass through Guiberson drillable packers.

OVERLAPPING TYPE

DEPENDABLE POWER

Beck Oil Company's rig No. 2 now operating on the Texas Gulf Coast. These are the 6-110 GM Diesel Twins that provide the punch for the Beck rig drawworks.

On Gulf Coast, GM Diesel Engines "Get With It!"

The Beck Oil Company is noted for its efficient drilling and production operations. Beck operates three rigs. The company this year will drill about 55 wells. That's a prodigious schedule . . . and that schedule will be realized with STEWART & STEVENSON SERVICES GM DIESEL POWER.

"We drill right, but fast," Lee Beck, partner in the Beck Oil Company says. "Take a look at our boys coming out of, or going back in the hole. They really get with it. GM Diesel Engines have proven their ability to perform excellently.

"Our experience has been lots of footage, fast trips and power to spare. We'd rather run an engine at two-thirds power than one at full power. That reserve sometimes makes the difference."

An example of the power Mr. Beck has reference to is on Rig No. 2, operating now in Liberty County, Texas. The drawworks is powered by two 6-110 GM Diesel Twins. That power enables the boys to "get with it."

With Stewart & Stevenson power, dependability is a guarantee.

STEWART & STEVENSON

STEWART & STEVENSON SERVICES, Inc.

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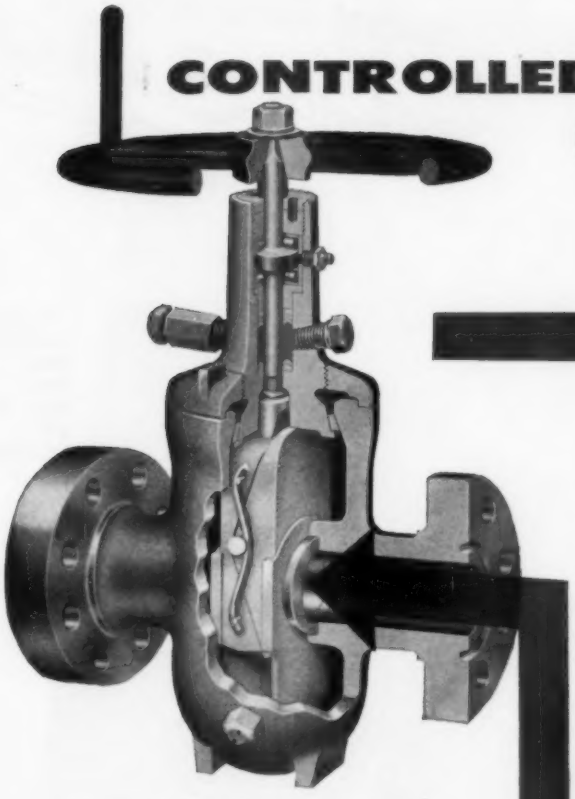
We're proud of our record in meeting every power need for the nation's leading drilling contractors

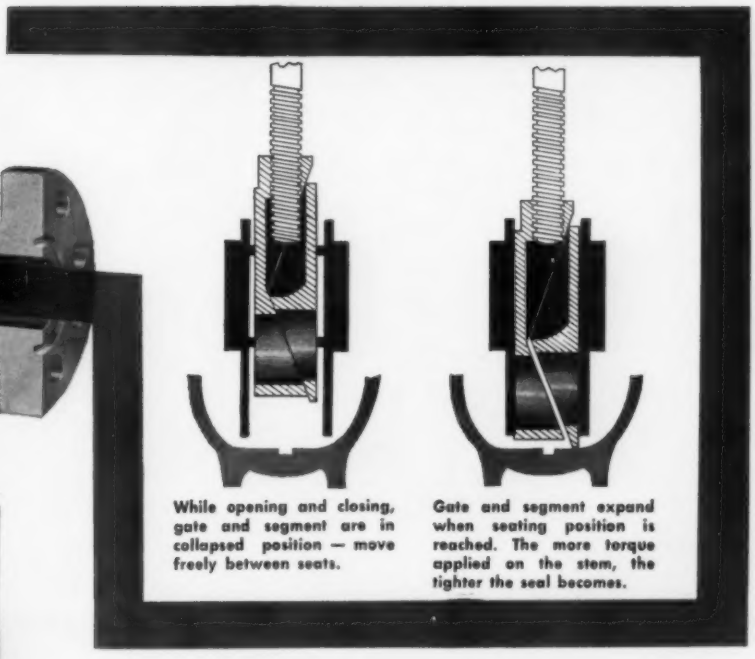
THE WORLD'S LARGEST DISTRIBUTOR OF DIESEL ENGINES

CONTROLLED FORCE SEATING

UPSTREAM AND DOWNSTREAM

W-K-M VALVES




While opening and closing, gate and segment are in collapsed position — move freely between seats.
Gate and segment expand when seating position is reached. The more torque applied on the stem, the tighter the seal becomes.

Specify W-K-M *Valves for christmas trees, flow wings, and all installations. Available in sizes 2" to 4"—working pressures from 500 lbs. to 15,000 lbs. Sold through Supply Stores everywhere.*

For design and operating features, sizes, pressures and complete dimensions, write Dept. A-909 for W-K-M ASA Through-Conduit Gate Valves Catalog 200.

W-K-M
DIVISION OF acf INDUSTRIES INCORPORATED

PLANT: MISSOURI CITY, TEXAS
MAILING ADDRESS: P. O. BOX 2117, HOUSTON, TEXAS

It takes force to seat and seal a valve against pressure. The parallel expanding gate in W-K-M® Through-Conduit Valves gives you this force, *but only after the gate reaches closing position.*

This force is applied simultaneously and equally to both seats. It is controlled by the torque applied on the valve stem. It is not and cannot be applied while gate is moving, because the gate and segment are held in a collapsed, free-moving position by means of alloy steel gate springs.

When the gate and segment reach closing position, the segment stops while the gate continues to move downward, forcing both the gate and segment against the two seats. The tighter the valve is closed, the greater the sealing force applied to the upstream and downstream seats.

When the valve is opened, torque on the valve stem releases the sealing force so that the gate and segment move freely to a fully open position.

With W-K-M's "CONTROLLED FORCE" seating, you always have a leakproof seal upstream and downstream.

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9711

MANUFACTURERS OF W-K-M GATE VALVES · acf LUBRICATED PLUG VALVES · KEY-KAST ALLOY STEEL PIPING FITTINGS · KEY RETURN BENDS AND FITTINGS

Now DX Sunray has cut evaporation loss with Microballoon spheres for 3 years

Working storage tank at Cromwell, Okla., is pumping or receiving 80 per cent of the time, has a throughput of 2,500,000 bbl. per year. It handles select crude and mixed crude-casinghead gasoline. It is owned by Mid-Continent Pipe Line Co., subsidiary of D-X Sunray Oil Co.

This ad originally appeared in the December, 1956 issues of OIL & GAS JOURNAL and PETROLEUM WEEK

Still cutting evaporation loss after ~~two years~~

with Microballoon spheres*

Two years ago, D-X Sunray Oil Co. equipped this 35,000-bbl. cone-roofed tank with "Microballoon" spheres made from BAKELITE Brand Phenolic Resins. Since that time, this vapor-stopping blanket has reduced evaporation loss an estimated 70 to 80 per cent according to D-X Sunray.

Installing the spheres took eight men about three hours. Within 24 hours, the "Microballoon" spheres had formed a blanket spread over the entire oil surface. Today, this foam seal is still effective after some 3,000,000 bbl. of oil have been pumped through the tank.

These results indicate the economy and effectiveness of this method of evaporation control. To learn more about it, write today to Department XX-00.

*Registered trade-mark of The Standard Oil Co. (Ohio)

For evaporation control...

BAKELITE BRAND **RESINS**

UNION CARBIDE

BAKELITE COMPANY, *Division of Union Carbide Corporation* UCC 30 East 42nd Street, New York 17, N. Y.

In Canada: Bakelite Company, Division of Union Carbide Canada Limited, Belleville, Ontario.

The terms BAKELITE and UNION CARBIDE are registered trade-marks of UCC.

By Merle Davis—Ralph Foster
Johnston Testers

FOR MORE INFORMATION ON YOUR DRILL STEM TEST

A check-off list for reverse circulating drill stem tests

The practice of reversing out the recovery of a drill stem test made in either an open or cased hole is now being widely used. The success of the practice has been proven with both high and low pressure tests and with both high and low liquid recoveries.

REVERSE CIRCULATION IN PERMIAN BASIN (OPEN HOLE TESTS)

The type A "sleeve" and the type B "knock-off" valves are preferred by the majority of the oil companies in West Texas. The type "B" sub has a slight edge because it can be run down in the drill collars closer to the test tool assembly.

The location of the reversing valves is dependent on the amount of "sample" to be left in the pipe and whether or not drill collars are run on top of the test tool assembly. The type "A" sub must be run above any small I. D. drill collars while the type "B" can be run "down" in the drill collars. It is common practice to separate the hydraulic valve and the shut-in valve (in the basic test tool assembly) by one or two singles—this provides a clean sample of the last fluid the formation produced into the drill pipe. The "sample" recovered above the shut-in tool and below the reversing sub may be slightly contaminated by the mud.

The high viscosity of the mud and the use of lost circulation material in some wells make it advisable to run both types of reversing subs each providing two reversing ports.

The reversing subs are opened *after* the mud pumps are started and mud is being pumped into the annulus. Normally, the difference in hydrostatic pressure (mud outside the drill pipe and oil, gas or water inside the pipe) will reverse almost all the fluid produced by the formation. In order to complete the reversing operation, the rams can be closed and *moderate* pressure applied to the hole. Extreme care must be used in pumping into the open hole to prevent breaking down a formation and causing lost circulation.

After reversing, the pipe can be pulled dry because the mud (which replaced the formation fluid) will drain back through the reversing sub ports.

Reverse circulation check off list

Before operating reversing valve

- ☐ Pump running
- ☐ Mud line valves positioned to divert mud flow to annulus
- ☐ Rams and/or Hydril checked for operation

Operating Reversing Valve (Type A and/or Type B)

- ☐ Close well in at surface
- ☐ Disconnect high pressure steel flow hose
- ☐ Close shut-in tool by rotating
- ☐ Reconnect high pressure steel flow hose
- ☐ Bleed down drill pipe (if go-devil hanger not used)
- ☐ Check mud in annulus (*must stay full* throughout reversing operation). Packer may be pulled loose if shut-in period is completed
- ☐ Drop proper go-devil to operate reversing sub
- ☐ Close surface valve (keep closed as long as annulus is *not* full)
- ☐ Control flow of recovery with surface valves so that hole remains full of mud.

NOTE: If reversing stops, apply moderate pressure to annulus or apply moderate pressure to tubing or drill pipe until normal circulation is barely established then go back to reverse circulation.

When natural reversing is completed or to speed reversing procedure

- ☐ Close rams or Hydril
- ☐ Apply moderate pump pressure to annulus
- ☐ Stop pumps when clean mud of normal weight is reversed
- ☐ Remove flow head and come out of hole at proper speed (prevent swabbing). Pipe should pull dry.

A supplemental article on Reverse Circulation in the Gulf Coast area is now being prepared. Look for it in this publication. For complete information on Reverse Circulation write Johnston Testers, Houston, Texas.

Merle Davis
Dist. Mgr.
Crane, Texas

Ralph Foster
Dist. Mgr.
Snyder, Texas

Type B Reverse Circulating Sub

Type A Reverse Circulating Sub

JOHNSTON TESTERS

A Subsidiary of Schlumberger Well Surveying Corporation

first in drill stem testing

HOUSTON, TEXAS

LONG BEACH, CALIFORNIA • CALGARY, CANADA

FORMATION AND CASING TESTING
JOHNSTON

INGALLS built an "island" to advance the search for oil!

Riding high in the Gulf . . . on its way to a new offshore oil field . . . goes the Kermac 46, largest submersible oil drilling platform ever to go to sea. It was built by INGALLS for Kerr-McGee Oil Industries, Inc. to carry the search for oil into new, hitherto undeveloped offshore areas.

The Kermac 46 is stabilized by a maze of pressure tubes. It is capable of riding out hurricanes . . . of sinking six wells without relocating, in water up to 70 feet deep.

Aboard, there are air-conditioned accommodations for a crew of 50, helicopter landing strip, Texas deck, and a derrick mast towering 156 feet above the derrick floor.

If *your job* calls for imagination and economy, experience and technical skills . . . consult a specialist — INGALLS!

THE INGALLS SHIPBUILDING CORPORATION

Executive Offices: Birmingham, Alabama
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Additional marine repair facilities at the Arnold V. Walker Shipyard, Inc., a subsidiary of Ingalls Shipbuilding Corporation, located at Pascagoula, Miss. Box No. 628. Telephone No. South 2-3511.

ENGINEERS: For jobs with a future, contact Ingalls today.

BUILDERS & DESIGNERS
of Offshore Service Vessels, Drilling and Commercial Barges, Tankers, Naval and Merchant Vessels.

INGALLS SHIPS SERVE THE WORLD

COOLING TOWER POWER
is most efficiently utilized by

Marley Multi-Blade Cast Fans

Marley fans are unexcelled for the job of converting applied power to actual cooling performance, but the qualities that make them positively distinctive are ultra-smooth operation and long-life durability. It requires just two words—MULTI-BLADE and CAST—to point out the characteristics that produce these stand-out advantages.

Watch a 22-foot, 12-blade Marley fan operate; listen to it operate. The customary "huff and puff" pulsation of large fans is not there. There is no structure-shaking vibration. The result? Longer life for speed reducer, drive shaft, fan cylinder and structure. That is the multi-blade advantage.

The Marley fan is inherently rugged and durable. Each blade is a single casting, a rigid, homogeneous unit of specially selected aluminum alloy that retains its aerfoil shape permanently. Marley fans never develop tip-sag or service flutter. The design completely eliminates weld and rivet failures, skin cracks, imperfect laminations and internal corrosion.

All machine operations on Marley blades and hubs are carefully quality-controlled. Blade surfaces are protected by a double-coated baked plastic finish. Each fan is balanced at the factory and match-marked for field assembly.

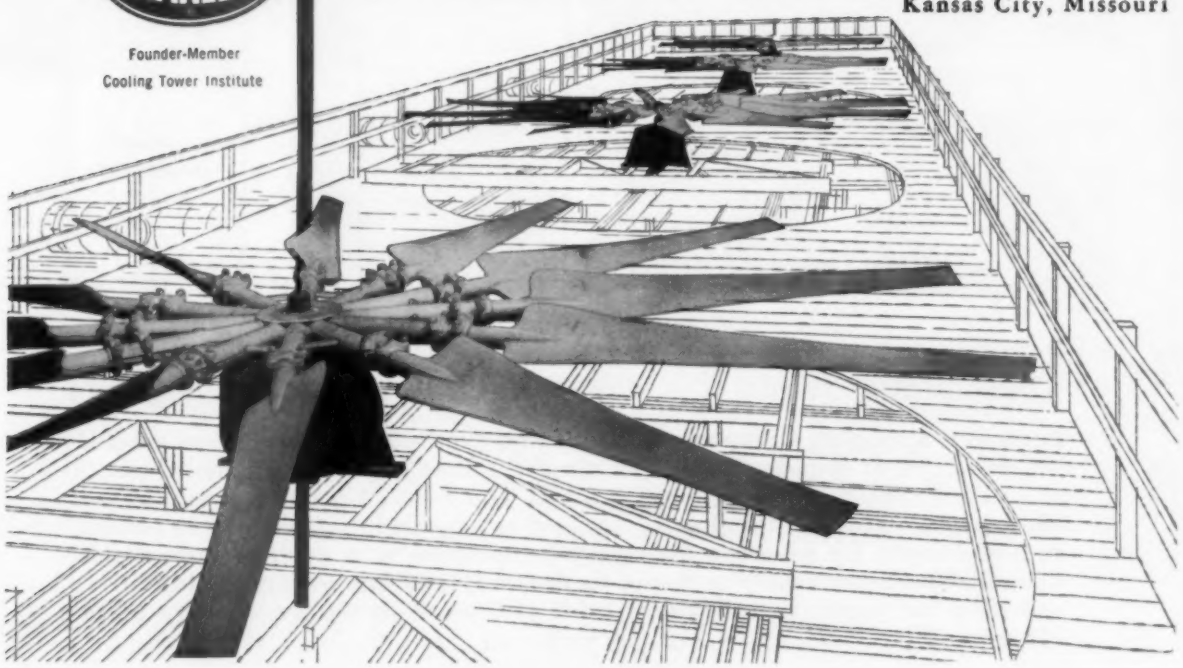
Owners of towers of all types and makes are modernizing their equipment by changing to Marley Multi-Blade Aerfoil Fans—often after side-by-side comparative test with present equipment. Write for Bulletin FH356 and get the complete story of modern design applied to cooling tower fans.

MARLEY

Founder-Member
Cooling Tower Institute

The Marley Company

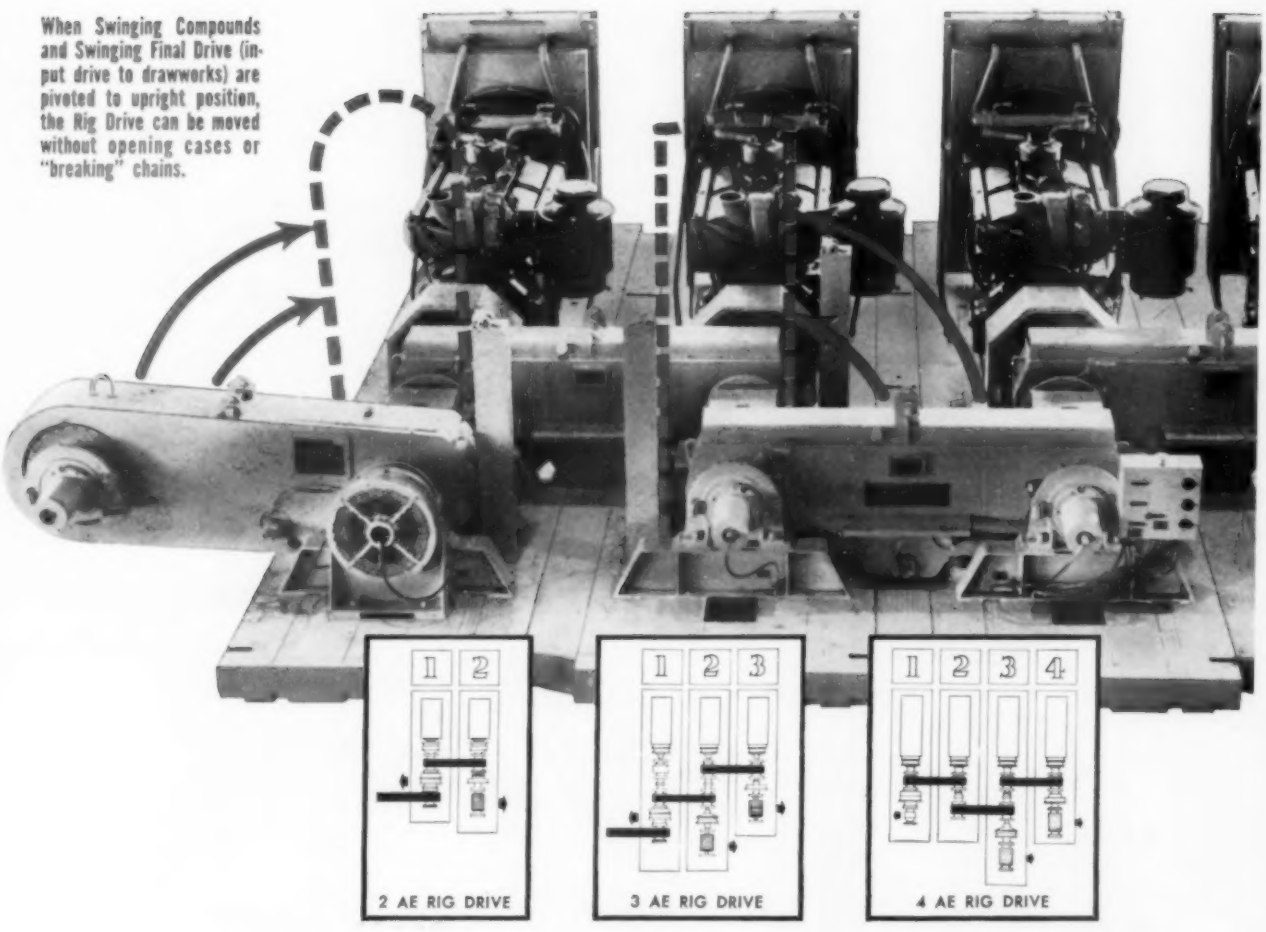
Kansas City, Missouri



. . . Proved by 10 YEARS

Mid-Continent

When Swinging Compounds and Swinging Final Drive (input drive to drawworks) are pivoted to upright position, the Rig Drive can be moved without opening cases or "breaking" chains.



Compounds swing for easy moving . . . quick rig-up!

Exclusive Swinging Compounds on all Mid-Continent AE Rig Drives simplify the addition of engines. All compound case assemblies are identical whether two-, three-, or four-engine Rig Drive. The Swinging feature makes possible moves without opening compound cases, draining oil, or "breaking" chains. Simply by pivoting Swinging Compounds to a vertical locked position, the units are ready to move to the next location. Swinging Final Drive, specified for many installations, adds still more to the versatility of this superior Rig Drive.

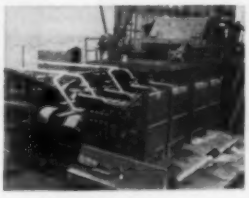
World-Wide Experience

*Swinging Compound**

rig drive for any engine

In 10 years of world-wide service, the Mid-Continent *Swinging Compound has proved its versatility and superiority for practical multiple power assemblies. The Mid-Continent Rig Drive is readily adaptable to most engine-drawworks combinations. Its exclusive Swinging Compounds speed up moves and reduce rig-up time. The Mid-Continent rig drive has a field-proved reputation for long service without overhaul. More than 100 of these outstanding rig drives have been specified by oil companies and drilling contractors for their world-wide drilling operations. Whatever your rig drive requirements, Mid-Continent's engineering staff is ready to assist you. Call your nearest Mid-Continent representative today.**

Since 1947, more than 100 Mid-Continent Rig Drives have been specified for drilling world-wide.



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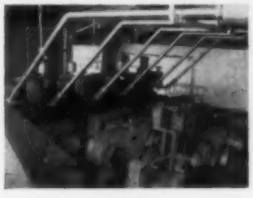

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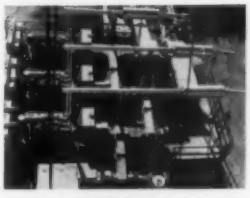

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Export Division: 45 Rockefeller Plaza, New York 20, N. Y. CABLE ADDRESS: MIDCUMPORT NYK

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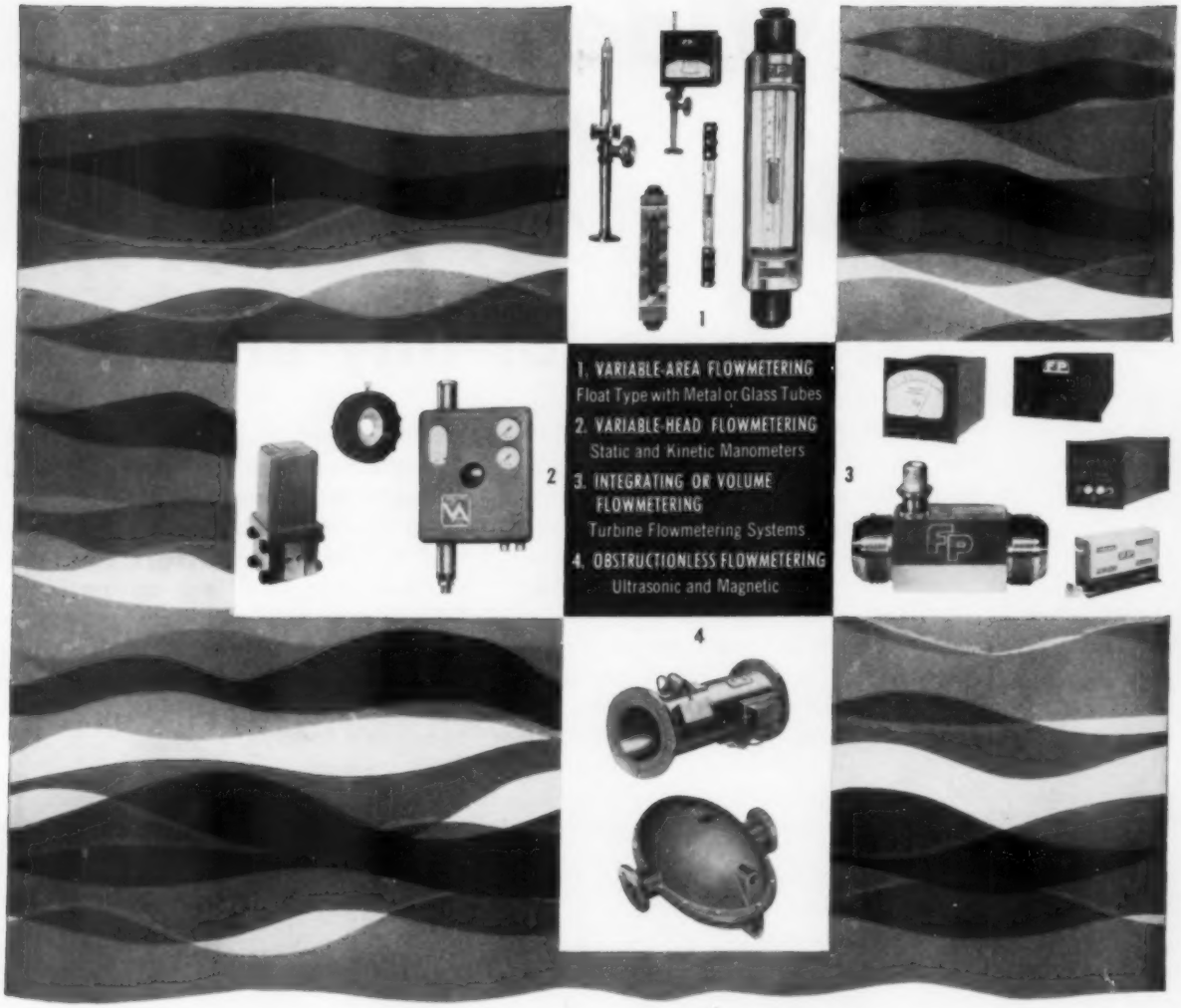


FLOWMETERING . . . for every flow condition

In a sense, *Fischer & Porter sells flowmetering . . . not just flowmeters!* We manufacture all four basic types. The selection of a particular type of F & P flowmeter is based on the flow conditions of your specific process . . . not on the "merits" of this or that only one-way-to-do-it flowmeter. To help you evaluate the many factors involved in the selection of a flowmeter, F & P has prepared technical briefs on the operating principles and advantages of the four basic types of flowmeters. These data include an *easy-to-use selection chart* and a *unique cost comparator chart.*

Write for your copy, today. And remember . . . F & P is the *only* company that manufactures all four basic types of flowmeters. Address request to Fischer & Porter Co.,3197 County Line Road, Hatboro, Pa. In Canada, write Fischer & Porter (Canada) Ltd., 2700 Jane St., Toronto, Ontario.

FISCHER & PORTER CO.

Complete Process Instrumentation

FR®

. . . standard on LINK-BELT oil field roller chain

U.S. Patent No. 2,517,497

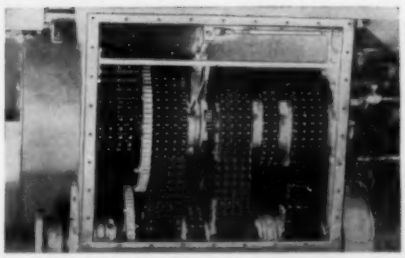
Increased sidebar Fatigue Resistance raises chain endurance limit . . . produces unmatched dynamic strength

No ordinary roller chain can long withstand the brute punishment of drilling service. That's why Link-Belt adds the FR process—a proven way to promote longer chain life. By compressing the metal around pitch holes, Link-Belt greatly strengthens the critical sidebar areas most vulnerable to fatigue . . . thus creating extraordinary *dynamic strength.*

And FR is just one of many Link-Belt "extras":

- SHOT-PEENED ROLLERS
- PRE-STRESSING
- E-Z ASSEMBLY
- CLOSER HEAT-TREAT CONTROL
- SHEPHERD'S CROOK COTTERS
- DOUBLE BOXING

Any leading supply store in the field can give you full details and a copy of Link-Belt Catalog 2780.



BREWSTER N-12 DRAWWORKS TRANSMISSION incorporates multiple-width Link-Belt Precision Steel roller chain with FR. *Since this feature involves no alteration in dimensions of chain parts,* Link-Belt roller chain is interchangeable with standard chains and sprockets.

LINK-BELT

ROLLER CHAINS & SPROCKETS

LINK-BELT COMPANY: Indianapolis 6, Houston 1, Dallas 21, Odessa, Tex., Shreveport, La., Los Angeles 33, Scarboro (Toronto 13); Export Office, New York 7. Distributors in All Fields. 14,000

Longer tandem life

One of 9 reasons why oil men find International Trucks cost least to own!

In any off-highway truck operation, you need a tandem and other major components built to stand up and take it, to keep costs way down.

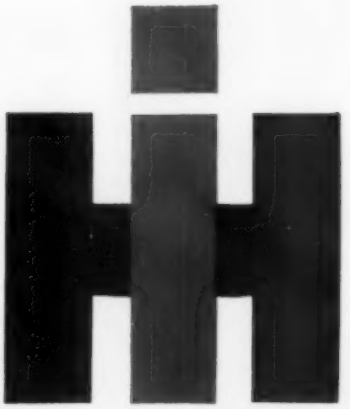
And cost records prove* that over the years International Trucks cost *least* to own!

The reason is simply this: It is International policy to build trucks that do the job better, do it longer at lower cost than any other make—International spends more to build the trucks so it costs you *least* to own.

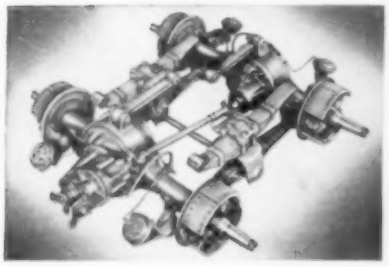
That's why there are more owners of Internationals than any other 6-wheel truck, and have been for the past 22 years!

The way to trim your trucking costs is to get together with your International Dealer, today. He's right at the other end of your phone.

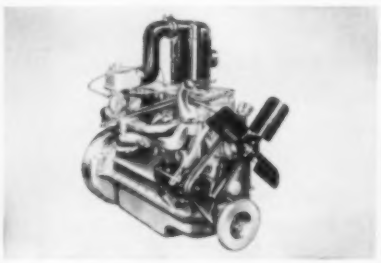
*Signed statements in our files, from fleet operators throughout the U.S., back up this statement.



INTERNATIONAL HARVESTER COMPANY, CHICAGO
Motor Trucks • Crawler Tractors
Construction Equipment • McCormick® Farm Equipment and Farmall® Tractors

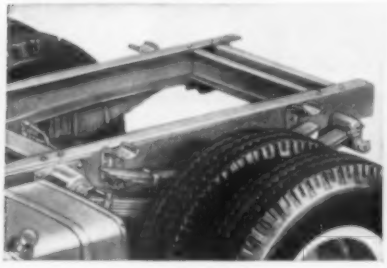


1 INTERNATIONAL tandems give longer, more dependable life. This unit has rubber bushings at all 10 oscillating points to reduce maintenance and lengthen life. Third differential with lock transmits power smoothly and evenly to each axle.

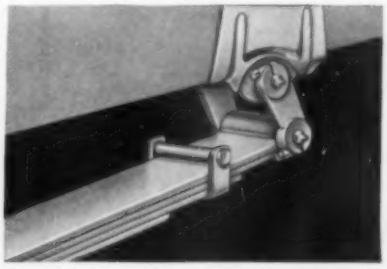


2 **Dependable, low cost power**—INTERNATIONAL-built six-cylinder engines with up to 212 hp. and 444 lbs. ft. torque. Also offered are three new V-8's, diesel and LPG powered engines to power-match and cost-match every oil field operation.

3 **Dependable stationary power** for equipment such as this auger drill shown above. Engines are available with increased cooling and other specialized attachments to keep the engine operating at peak efficiency and longer.



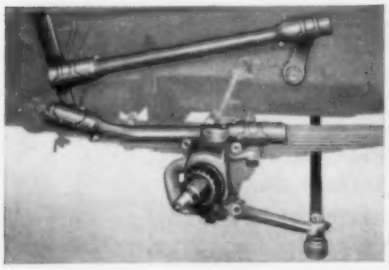
4 **Rugged frame** has plenty of sturdy crossmembers. Non-crystallizing, cold squeezed rivets are used for extra rigidity and proper flexibility on all types of service. Husky front and rear sections add to the safety margin built into every frame.



5 **Cradle action front and rear springs** cushion load and driver. Proper design and mounting provide better load support, smoother riding and longer spring life. Rear-shackled front springs for greater stability and increased life.

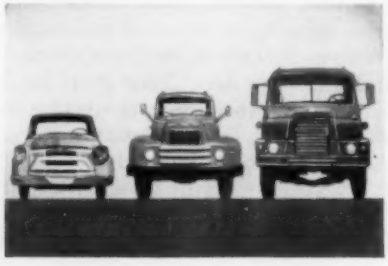
6 **Full torque power take-off.** INTERNATIONAL offers sturdy, low cost top-mounted power take-offs as factory installed options. You get full use of engine power in all transmission output speeds to adequately power auxiliary equipment.

INTERNATIONAL six-wheelers are rated from 22,000 lbs. GVW to 76,800 lbs. GCW. The 406 cubic inch engine in this model is one of nine six-cylinder power plants that make INTERNATIONAL Trucks outstanding for dependability and economy in all types of service. All-wheel-drive models offered for the extra traction and flotation needed for off-highway use. You name the job, INTERNATIONAL builds the truck that will do it better, longer and at *least* cost.



7 Safer, easier steering and greater maneuverability result from cam and twin lever gears with controls mounted *ahead* of front axle. Steering wheel is comfortably positioned. Power steering available on most models.

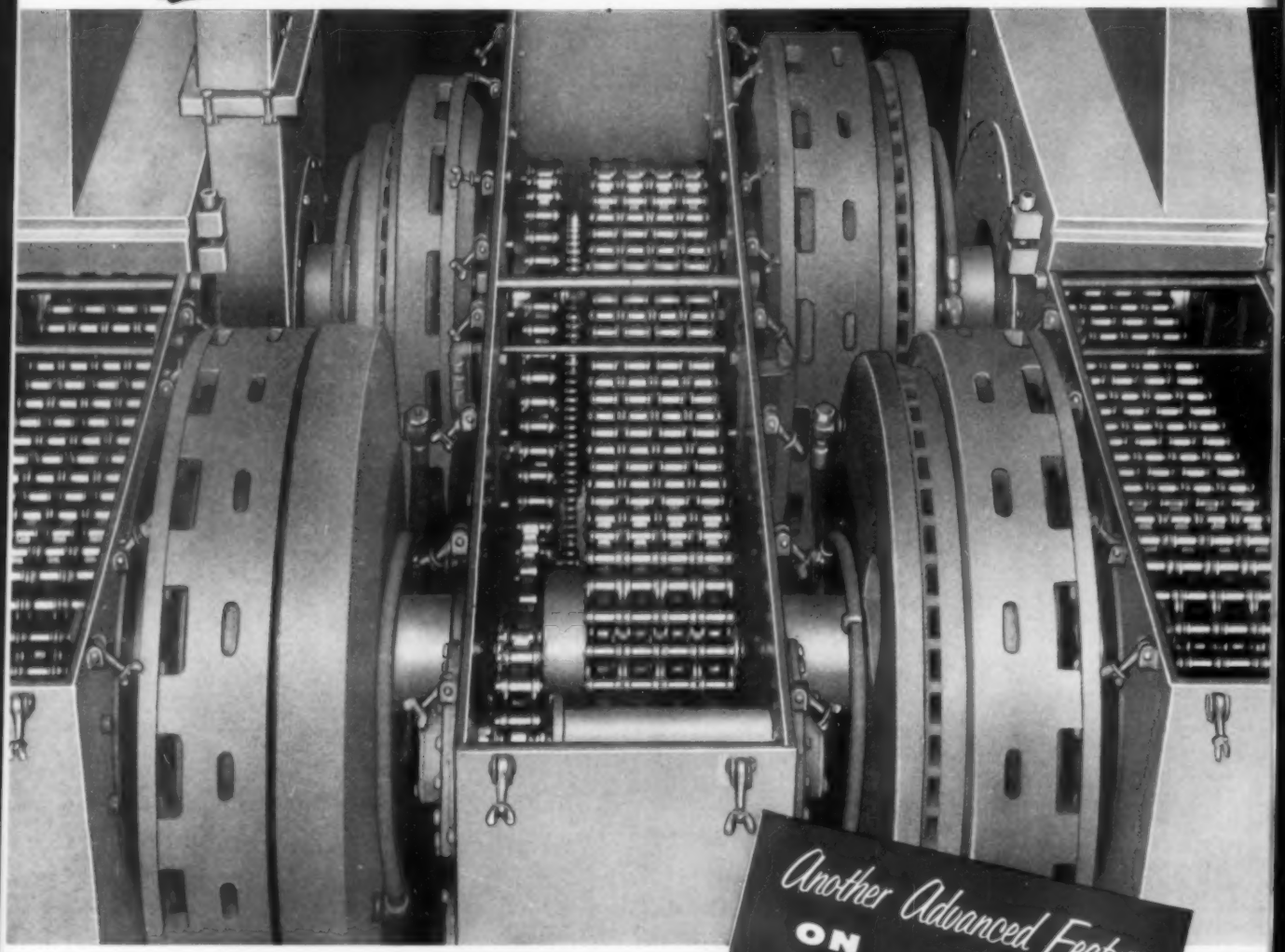
8 All-wheel-drive models have the extra traction and pull needed for all tough, off-highway operations. Completely factory-built 7,000 to 43,000 lbs. GVW. See this new, sturdy Travelall now. Low height with ample ground clearance.



9 World's most complete line. There is an INTERNATIONAL "tailor-made" for every job, half-tonners to 96,000 pounders. Choice of 4-wheel, 6-wheel and all-wheel-drive models, conventional and COE design. Every one built to cost *least* to own.

GIVES YOU SUPERB

"Jet Age" Rig Performance

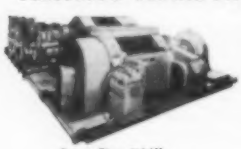


THE SENSATIONAL ALL-FRICTION CLUTCH TRANSMISSION

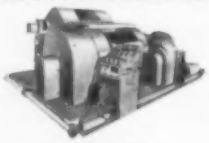
Only Wilson has engineered and is producing rigs with advanced JET AGE PERFORMANCE! Each is designed around the world's newest, greatest, and most advanced transmission. A transmission as delicate as the finest jeweled watch, but as rugged and reliable as "Big Ben." Four great Air-Tube Disc clutches in this chain drive transmission mean that Wilson Super Rigs will *out perform any other rigs of comparable size . . . and at smoother, faster speeds!* Never an outmoded rig made over . . . Wilson Rigs are ALWAYS NEWEST . . . with the most advanced engineering throughout. Write for our New Catalog No. 257.

ALWAYS YEARS AHEAD . . . WILSON SETS THE PACE!

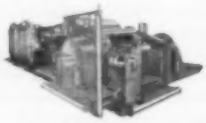
WILSON
MANUFACTURING CO., INC.
WICHITA FALLS, TEXAS, U. S. A.
The Home of RED IRON
BE MODERN—BUY WILSON



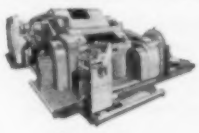
Super Titan "66"
22,000 Ft.—4½" Drill Pipe
25,000 Ft.—3½" Drill Pipe



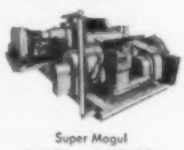
Super Titan "56"
15,000 Ft.—4½" Drill Pipe
19,000 Ft.—3½" Drill Pipe



Super Atlas
11,000 Ft.—4½" Drill Pipe
13,000 Ft.—3½" Drill Pipe



Super Giant
9,000 Ft.—4½" Drill Pipe
11,000 Ft.—3½" Drill Pipe



Super Mogul
7,500 Ft.—4½" Drill Pipe
8,500 Ft.—3½" Drill Pipe

THE MOST MODERN AND COMPLETE LINE OF DRILLING RIGS IN ALL THE WORLD

In Aluminum too...

Installation of aluminum piping for handling ammonium nitrate.

...a three-way saving in your piping dollars

When you specify TUBE-TURN* products, you are sure of getting the exact fittings for your job because the Tube Turns' line is the world's most complete . . . *you save engineering time.* Your welders can work faster because fittings are completely identified and perfectly uniform . . . *you save construction time.* You can buy all your fittings with one order from your nearby Tube Turns' Distributor . . . *you save purchasing time.* Are *you* getting these savings in piping costs?

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OTHER APPLICATIONS SHOWN ON REVERSE SIDE ▶

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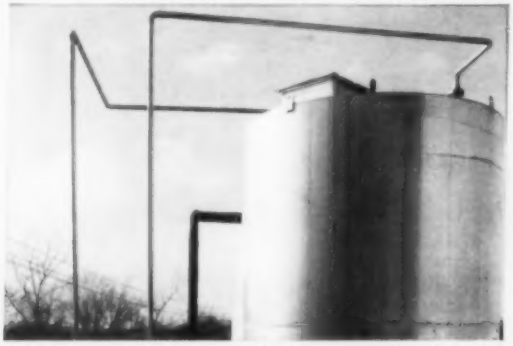
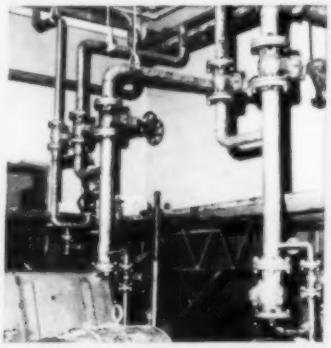
You save manhours with the line of 12,000 TUBE-TURN® products

LIQUID SUGAR. Part of welded aluminum piping system for processing of liquid sugar. When you specify TUBE-TURN* products, you can count on getting the right type, size, schedule and material for every piping service. Saves engineering manhours.

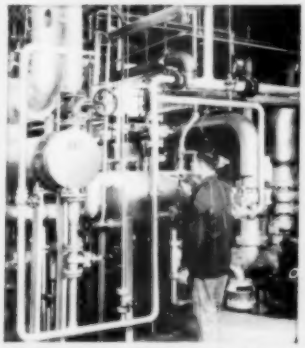
"A-POWER." These TUBE-TURN Aluminum Elbows are for nuclear swimming pool reactor water-coolant lines. Tube Turns' experienced engineering service helps you solve piping problems of all kinds. Contact your nearby Tube Turns' Distributor or District Office.



OLEIC ACID. These welded aluminum lines for oleic acid storage show how this strong but lightweight construction can be utilized for corrosive service. Your nearby Tube Turns' Distributor can give you complete-line service promptly . . . to help you save purchasing time.



REFINERY CATALYST is handled by this aluminum piping, equipped with TUBE-TURN welding fittings and flanges. Uniformity of TUBE-TURN products saves construction manhours



PURE WATER. Passive aluminum piping guards against contamination in this water purification plant. You can buy *all* your fittings with *one* order when you specify TUBE-TURN products.

NEW BOOKLET—This new Tube Turns' catalog gives helpful information on aluminum pipe, fitting and flange materials. Mail the coupon for your free copy.

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They Say—

Canadian issue put to use

Dear Sir:

I have just finished reading your Canadian issue (August 19, 1957), and I think you should be commended for a job well done. The issue (and also your 1956 issue) is of particular value to us, as our company is just getting started in Canada, and you have assembled a lot of very useful information in one easy-to-use source.

We were particularly interested in the articles on the foothills, as we are presently drilling a foothills wildcat (McDermott-Triad 9-17-38-17w5 Cline River). The well is on a pretty fair-sized structure, and we certainly have hopes of finding another Savanna Creek or Pincher Creek.

J. W. Wood, Jr.
J. Ray McDermott & Co., Inc.
Houston.

Plenty of oil

"Both past experience and future outlook provide a firm basis for confidence that domestic oil producers can continue to supply plenty of oil at reasonable prices. Authoritative estimates of the undiscovered oil in U.S. areas yet to be explored run into the hundreds of billion of barrels.

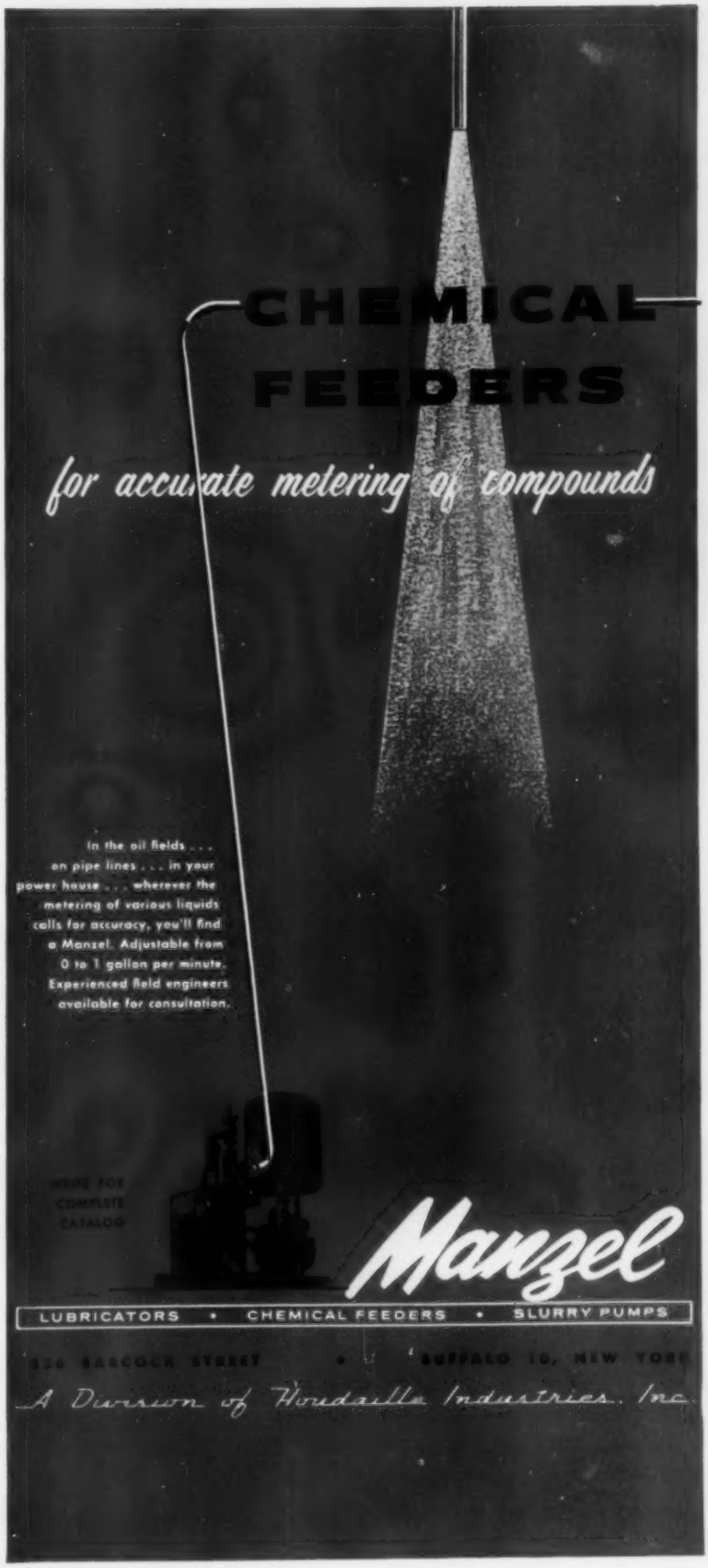
"And there is every reason to believe that these estimates will prove to be too low as new scientific techniques are developed.

"It is a fact—and not theory—that an abundance of domestic oil, produced by an expanding, competitive oil industry in the United States is the best safeguard for the consumer in peace or in time of emergency."

Robert L. Wood, president, Independent Petroleum Association of America, in the Independent Petroleum Monthly.

Research grows the fastest

"That research is a worthwhile investment is now accepted by all progressive industry, as indicated by steadily increasing appropriations for its promotion. Little more than 20 years ago, research was a term found in a few industrial budgets. Where it existed at all, it was likely to conduct its activities on a hole-in-the-wall basis. Because of this, it is difficult even to estimate how much money was spent in those years for research purposes, but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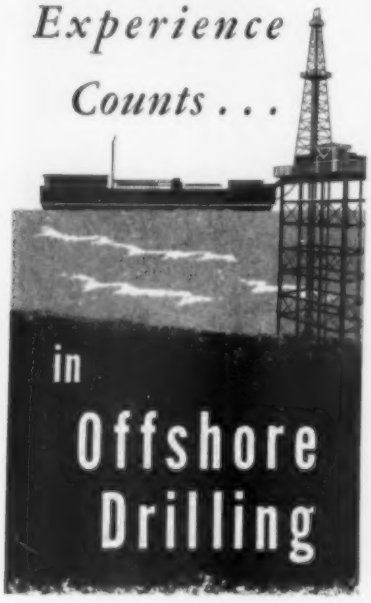

and so does . . .

EQUIPMENT

Reading and Bates operates two Levingston offshore drilling tenders with National Supply Co. Type 130 rigs, capable of drilling to a depth in excess of *20,000* feet in water *100* feet deep.

DEPENDABILITY

Reading and Bates is a dependable contractor with seasoned, experienced men operating their rigs. Contracts are fulfilled to the last letter.

KNOWLEDGE

Reading and Bates are specialists in offshore drilling. Their basic knowledge of offshore drilling problems, plus their wide experience, assures you of a job well done.

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- 820 Maritime Bldg., New Orleans, Louisiana

the best guess is that it ranged in the neighborhood, nationwise, of $200 million.

"This year, one authoritative survey indicates that research costs in the United States will exceed $7 billion, or 36 times the total of 20 to 30 years ago. It is our fastest growing industry."

W. Alton Jones, chairman of the board, Cities Service Co., in an article in the Journal of Commerce.

Natural-gas compromise

"The Harris-O'Hara natural-gas bill . . . is not an ideal piece of legislation, but it probably comes as close to being a reasonable and workable compromise as any form of regulation in the intricate field of natural-gas production can be.

"It differs significantly from the natural-gas bill which was passed in 1956 but vetoed by President Eisenhower. . . . The new bill is not an exemption bill, as its predecessor was. It would not free natural-gas prices completely from federal control. Nevertheless, it would ease some of the current restrictions imposed following the highly controversial Phillips decision.

"Actually, a convincing argument still could be made for outright exemption of natural-gas production . . . Merely the fact that neither Congress nor the administration, for political reasons, would buy such complete decontrol . . . makes any compromise palatable and the search for a reasonable compromise mandatory . . .

"The FPC needs a great deal of flexibility. This it would be given in the proposed legislative mandate that producer price constitutes a reasonable market price, arrived at by arms-length bargaining, and consistent with the need to assure adequate supplies.

"The difficult question here concerns not so much what the bill requires as price criteria but its prohibition that any consideration be given to costs . . .

"The argument that potential price increases would be restrained, in our opinion, is not a valid one for unsound and unsuitable regulation of private business . . .

"If the sole concern of economic policy is to prevent price increases in the economy, then it would follow that public-utility pricing should replace all free pricing in the market place and that, of course, wages should be subjected to similar treatment. Any such suggestion is absurd . . .

"One way to gain perspective about the gas bill is to compare the controls which it imposes not with the unsound and ill-adapted control which exists today but with the degree of regulation prior to the Phillips decision . . .

"It is hard to see how any better way out of the natural-gas impasse can be found than the general approach of the Harris-O'Hara bill."

Editorial in the Journal of Commerce.

Keeping one eye cocked

"There is no doubt that we have won a battle. That is, to finally obtain from the President and his cabinet the direct policy that imports of crude must be limited to preserve our national security and a healthy domestic industry.

"The effects will certainly not be immediate; however, by October of this year we should see a substantial reduction of imports and an increased demand for domestic crude. What this increase will be is problematical and depends entirely on how closely the importers comply with the directive and the fluctuation of domestic demand.

"It appears safe to say at this time that under this plan, the demand for Oklahoma crude should be increased a minimum of 25,000 bbl. per day. The O.I.P.A. will watch daily the progress of this program and if limitations of this type again fail, we will be prepared to take further action."

Max Genet, Jr., manager, Oklahoma Independent Petroleum Association, in a bulletin to members.

CALENDAR OF EVENTS

SEPTEMBER

8-13 American Chemical Society, 132nd national meeting, New York City.
9-10 Independent Natural Gas Association of America, annual meeting, Shamrock Hilton Hotel, Houston.
9-11 American Institute of Electrical Engineers, conference of the petroleum industry committee, Sheraton Hotel, Philadelphia.
10-12 Midwest Gas Association, school and conference, Iowa State College, Ames, Iowa.
11-13 National Petroleum Association, fifty-fifth annual meeting, Traymore Hotel, Atlantic City, N. J.
12-14 Ardmore, Okla., Geological Society, Criner Hills field conference, Lake Murray Lodge, Ardmore, Okla.
12-14 Wyoming Geological Association, twelfth annual field conference, Southwest Wind River basin, Noble Hotel, Lander, Wyo.
19-21 Rocky Mountain Oil Show, fairgrounds, Casper, Wyo.
20 Southern Gas Association, dispatchers' round-table conference, Baker Hotel, Dallas.
20 Southern Gas Association, compressor station round-table conference, Baker Hotel, Dallas.

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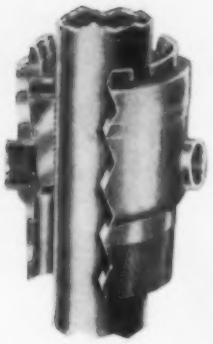

Fig. 91

Simplicity and compactness, for ease of installation and neatness of hookup, are incorporated into the Larkin Casing Head (2000 psi test, 1000 psi working pressure). It is designed to provide a safe and economical means of suspending and packing off casing strings. This head has been tested to support 225,000 lbs., equivalent to 5600' of 7" 20-lb. casing with a safety factor of 2.

DEPENDABLE . . .

ECONOMICAL . . .

VERSATILE . . .

LARKIN CASING HEADS AND TUBING HEADS

For Wells of Medium Depths and Pressure

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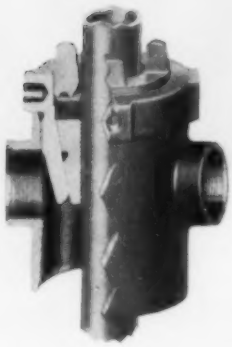
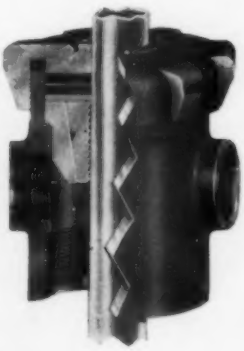
Type L

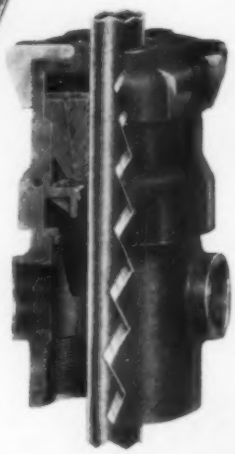
A new member of the Larkin Well Head Line, the Type L Tubing Head fills a need in low pressure areas where economy may be effected with complete safety. It is forged steel construction, full opening, 2000 lb. psi, top of body threaded 7" API to accommodate control equipment, hinged three-segment slips, 2" or 3" side outlets.



Type R

The Larkin Type R Tubing Head is a conversion from the Type SR Head. This ease of conversion makes it possible to use the same stripper adapter and Neoprene stripper when working on any well equipped with a Larkin Tubing Head.





Type SR

The Larkin Type SR Tubing Head is a slip suspension head, equipped with a Neoprene Stripper which serves as a blow-out preventer and oil saver while tubing is being pulled or run. It is very suitable where higher pressures might be encountered.

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22-25 American Society of Mechanical Engineers, petroleum mechanical engineering conference, Mayo Hotel, Tulsa.

23-24 University of Oklahoma, School of Petroleum Engineering conference on fluid flow through porous media, Norman, Okla.

23-25 American Society of Mechanical Engineers, fall meeting, Statler Hotel, Hartford, Conn.

25 Natural Gasoline Association of America, regional meeting, Northern Hotel, Billings, Mont.

26-27 Western Petroleum Refiners Association, Rocky Mountain regional technical-industrial relations meeting, Henning Hotel, Casper, Wyo.

26-27 Mid-Continent Oil and Gas Association, Louisiana - Arkansas division, Roosevelt Hotel, New Orleans.

30-Oct. 2 American Oil Chemists' Society, 1957 fall meeting, Netherland Plaza Hotel, Cincinnati.

OCTOBER

1-2 Texas Mid-Continent Oil and Gas Association, thirty-eighth annual meeting, Texas Hotel, Fort Worth.

1-4 National Association of Corrosion Engineers, north-central region, Sherman Hotel, Chicago.

1-4 National Association of Corrosion Engineers, south-central region, municipal auditorium, Oklahoma City.

2-4 Golden Trend Oil Show, Pauls Valley, Okla.

6-9 Society of Petroleum Engineers of American Institute of Mining, Metallurgical, and Petroleum Engineers, fall meeting, Adolphus, Baker, and Statler Hilton Hotels, Dallas.

7-9 National Electronics Conference, thirteenth annual meeting, Hotel Sherman, Chicago.

7-9 American Gas Association, annual convention, Kiel Auditorium, St. Louis.

7-11 American Institute of Electrical Engineers, fall general meeting, Morrison Hotel, Chicago.

10-11 California Natural Gasoline Association, thirty-second annual fall meeting, Huntington-Sheraton Hotel, Pasadena.

10-12 American Society of Mechanical Engineers, American Institute of Mining, Metallurgical & Petroleum Engineers, fuels conference, Chateau Frontenac, Quebec.

10-13 Louisiana Gulf Coast Oil Exposition, Lafayette, La.

13-15 American Association of Oilwell Drilling Contractors, seventeenth annual meeting, Mayo Hotel, Tulsa.

13-19 OIL PROGRESS WEEK.

15-16 Gas Measurement Institute, sponsored by the University of Kansas, American Legion Hall, Liberal, Kans.

16-17 South Dakota Independent Oil Men's Association, convention, Alonzo Ward Hotel, Aberdeen, S. D.

17-18 American Institute of Mining, Metallurgical, and Petroleum Engineers, Southern California petroleum section, fall meeting, Biltmore Hotel, Los Angeles.

17-19 Four Corners Geological Society, second field conference, Gallup, N. M.

18 American Institute of Chemical Engineers, South Texas section, twelfth annual technical meeting, Moody Convention Center, Galveston, Tex.

20-22 National Association of Oil Equipment Jobbers, annual convention and trade show, Hotel Peabody, Memphis.

23-25 National Association of Corrosion Engineers, western region, seventh annual conference, U S. Grant Hotel, San Diego, Calif.

23-25 National Association of Corrosion Engineers, seventh biennial Permian basin corrosion tour, Lincoln Hotel, Odessa, Tex.

25-26 Abilene, Tex., Geological Society, Fort Worth Geological Society, joint field trip, San Saba County, Texas.

24-25 Rocky Mountain Oil and Gas Association, midyear meeting, Northern Hotel, Billings, Mont.

24-25 Western Petroleum Refiners Association, regional technical-industrial relations meeting, Rufus Garrett Hotel, El Dorado, Ark.

25 Natural Gasoline Association of America, southern regional meeting, Washington - Youree and Captain Shreve Hotels, Shreveport.

27-29 Independent Petroleum Association of America, annual membership meeting, Statler Hilton Hotel, Dallas.

31-Nov. 1 American Association of Petroleum Geologists, Mid-Continent regional meeting, Education Building, Fairgrounds, Tulsa.

NOVEMBER

3-8 Society for Nondestructive Testing, second international conference, Hotel Morrison, Chicago.

6-8 Gulf Coast Association of Geological Societies, seventh annual convention, Roosevelt Hotel, New Orleans.

6-8 Society of Automotive Engineers, national fuels and lubricants meeting, Hotel Statler, Cleveland.

11-14 Society of Exploration Geophysicists, twenty-seventh annual meeting, Statler-Hilton Hotel, Dallas.

11-14 American Petroleum Institute, thirty-seventh annual meeting, Conrad Hilton Hotel and Palmer House, Chicago.

12-14 National Association of Corrosion Engineers, northwest region fall meeting, Penn-Sheraton Hotel, Pittsburgh.

22 Natural Gasoline Association of America, Panhandle Plains regional meeting, Herring Hotel, Amarillo, Tex.

DECEMBER

1-3 Interstate Oil Compact Commission annual meeting, Tulsa.

1-6 American Society of Mechanical Engineers, annual meeting, Statler Hotel, New York.

2-6 Twenty-sixth Exposition of Chemical Industries, Coliseum, New York.

8-11 American Institute of Chemical Engineers, annual meeting, Conrad Hilton Hotel, Chicago.

JANUARY

16-18 Association of Oilwell Servicing Contractors, second annual convention, Baker Hotel, Dallas.

19-22 Pipe Line Contractors Association, tenth annual convention, Boca Raton Hotel and Club, Boca Raton, Fla.

31 Natural Gasoline Association of America, regional meeting, Skirvin Hotel, Oklahoma City.

FEBRUARY

16-20 American Institute of Mining, Metallurgical, and Petroleum Engineers, annual meeting, Hotel Statler, New York.

26-28 American Petroleum Institute, Division of Production, southern district meeting, Shamrock-Hilton Hotel, Houston.

28 Natural Gasoline Association of America, Permian basin regional meeting, Lincoln Hotel, Odessa, Tex.

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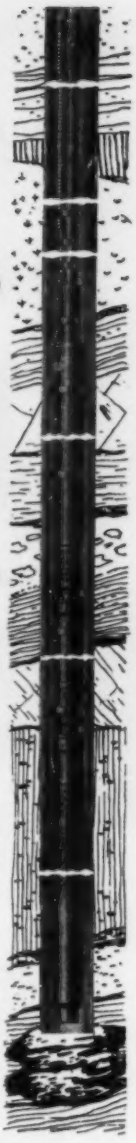

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TULSA, OKLAHOMA

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JOURNALLY SPEAKING

It's Not the Heat . . .

DURING the August dog days it's our custom to clean out that bottom drawer, where, all during the year, we toss clippings and notes with the thought that they might find a use if we are very, very hard up for material some day. This is that day.

Here's one that's so old we hope everybody has forgotten it. It's a plan for calendar reform. We don't know who originated it, but it could well be adapted to and adopted by the oil industry. With this new calendar, every month would look like this:

SUN	SUN	SAT	THU	WED	TUE	MON
7	6	5	4	3	2	1
14	13	12	11	10	9	8
20	19	18	17	16	15	1
½	26	25	24	23	22	21

Now here are some of the advantages of this new system:

Since every assignment is wanted yesterday, a job can be started on the seventh and completed on the first.

So many reports and assignments are due on the first that there are two of them, thus giving twice the possibility of being on time.

There is no Friday, because this day is wholly wasted on meetings anyway.

A one-half day is provided for calls by salesmen, agents, and supply men.

There are only 26 days, so there won't be so much month left over at the end of the budget.

Every week has two Sundays, because this is the only day a man can get anything done.

While we are at this business of calendar reform, we have decided that the month of August ought to be abolished and just left out of the calendar. The way things are now, the whole month is pretty much a net loss.

One-third of the people are on vacation. Another third just got back and haven't got rested up yet. The remainder are getting ready to leave and are too exhausted to do much. Those still around the shop are trying to fill in for those away as well as handling their own work, with the result that neither job is done very well.

Besides, nothing much of importance ever happens in August anyway, and what does could much better happen in some other month.

. . . It's the Stupidity

HAVING accomplished the task of calendar reform, we turned our talents to thinking up mythical names for officials of a hypothetical oil company. By quitting time we had got this far:

Macon Profitz, chairman of the board; I. A. Gree, president; Macon Profitz, Jr., assistant to the president; Tommy Ullsers, executive vice president; Ino Ann Surz, secretary to the vice president; May B. Heezin and Doris Klozed, secretaries to the chairman.

Ira Cordit, corporation secretary; Ucant Doodat, general counsel; Cutter X. Spence, treasurer; Tellem Little, director of public relations; Watts D. Price, purchasing agent; Hiram Mann, personnel director; Kantby Rushed, director of research.

Drillem N. See, chief geologist; Howe D. Parue, chief scout; Needa Spread, chief landman; Dewitt Miway chief engineer; Dessim L. Point, assistant chief engineer; Otto Cutback, proration engineer; Openhiem Wider, production superintendent.

Getmor Overide, manager of farmouts; Weelby D. Operator, unitization manager; Kantze A. Payout, evaluation engineer; I. Goofta Gain, seismograph interpreter; S. Kweezim Argin, director of dealer relations; Willett Sellam, advertising manager; Watts R. Step, safety director; Raizon Cain, efficiency expert; Dewey Settle, claims department; Bailing Wire, maintenance superintendent; F.P.C. Happy, manager of natural-gas department.

Au Revoir

IF THE ABOVE two items don't convince you that we need a vacation, this surely will:

Once there were three little kittens whose names were Un, Deux, and Trois. Halfway across a frozen lake the ice broke, and Un Deux Trois Quatre Cinq.

—Henry D. Ralph.

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Has O'Mahoney stopped beating his wife?

HAS Senator O'Mahoney ever stuffed a ballot box, bribed election officials, or paid off a political debt with public funds? Has he violated the Corrupt Practices Act, put relatives on the payroll, or sold his vote?

Does he act for the special interests of his constituents instead of the general welfare of the whole nation? Has he stopped beating his wife? Does he dye his hair, rob banks, or eat crackers in bed?

We don't know that he has, but elected officials have been known to do such things. And Senator O'Mahoney is an elected official. Therefore he ought to be investigated to see if he has violated any laws. If he hasn't, then some more laws ought to be passed to keep him from doing anything he shouldn't.

SUCH A STATEMENT makes just as much sense as the report on the oil industry that Senator O'Mahoney has just released.

That report lists 20 or 30 activities in which one or more oil companies might possibly be skirting the fringes of some law, or might be doing something not quite ethical, or might be acting in ways that O'Mahoney considers inadvisable for some reason.

No specific charges are made. No facts are arrayed to make even a prima facie case for indictment. The report is little more than a collection of vague hints, suppositions, innuendoes, hypotheses, and suspicions.

Yet on such a basis the report gives the official implication that the oil industry is a bunch of scheming knaves, not to be trusted as far as O'Mahoney can throw a derrick.

This is a shameless abuse of legislative investigating prerogatives. The fact is that the report was not based on an investigation at all. The subjects of most of the "conclusions and recommendations" were never brought up in the few hearings that were held. The alleged malefactors were never publicly confronted with many of the charges.

The report was built up by hired hands on the Senate staff. By what means they arrived at what they consider evidence is not revealed, but there is reason to believe it was chiefly newspaper clippings compounded with their own private suspicions.

IN INVESTIGATING COMMUNISTS and labor racketeers, congressional committees call suspects before them and ask specific questions. If such parties then plead the Fifth Amendment there is at least a plausible ground for suspicion of guilt.

Why can't corporations get as fair treatment? The O'Mahoney-type "investigation" doesn't even pretend to give the oil industry a chance to explain itself.

Broad congressional investigations are necessary for framing new legislation. But this one wasn't a proper investigation and doesn't point to any specific legislation. It's nothing but a smear.

Good Wells Make Good News

September 9, 1957

SUCCESSFUL ACID TREATMENTS depend largely on the way they are "tailored" to the requirements of the well. Here are four examples of excellent results obtained from Dowell-tailored acid treatments.

- **Wabash County, Illinois** (New Well): Open hole completion in highly soluble O'Hara lime, 2876 to 2884 feet, tested 12 bopd. Since regular acid had given poor results in nearby wells, Dowell recommended Acid Petrofrac®. A 3000-gallon treatment was performed, down 4½-inch casing preceded by a 500-gallon spearhead of mud remover acid. *After treatment, well stabilized at 75 bopd and treatment paid out in less than ten days!*

- **Webster Parish, Louisiana** (New Well): First attempt to acidize this Smackover lime interval, 11,268 to 11,297 feet, unsuccessful because cold acid shrunk the tubing and allowed communication through the packer. Dowell suggested heated acid, prepared by mixing 60 barrels 28% acid with equal quantity hot water—heated to 150°F. by paraffin solvent heater. Well acidized successfully without communication despite 5000 psi tubing pressure. Results: *Well tested 126 barrels 57 gravity oil in 11 hours through 12/64-inch choke.*

- **Washakie County, Wyoming** (Old Well): Production from highly soluble Embar lime had declined to 10 bopd. Sour crude indicated presence of iron sulfide. Since regular acid dissolves iron sulfide and might let it reprecipitate as iron hydroxide, Dowell suggested Stabilized Acid. 30 days after treatment with 3000 gallons, *production was steady at 100 bopd.*

- **San Juan County, Utah** (New Well): Well first perforated and completed in Upper Paradox lime of Aneth Pool, 5628 to 5648 feet. Well was given Retarded Acid treatment with Mud Acid spearhead. Following a 71 boph test, well was killed with mud and the Lower Paradox tested. After lower zone proved non-productive upper zone would not respond to normal mud removal techniques. To remove mud, 10,000 gallons Retarded Acid was used. After first 6000 gallons down annulus at 7½ bpm, 100 ball sealers were used. *Well swabbed 70 boph, indicating successful treatment.*

Regardless of your problem, you can depend on Dowell's fund of knowledge, addition agents and experience to "tailor" acid treatments to your needs. For service or more information, call any of the 165 Dowell offices in the United States and Canada; in Venezuela, contact United Oilwell Service. Or write Dowell Incorporated, Tulsa 1, Oklahoma.

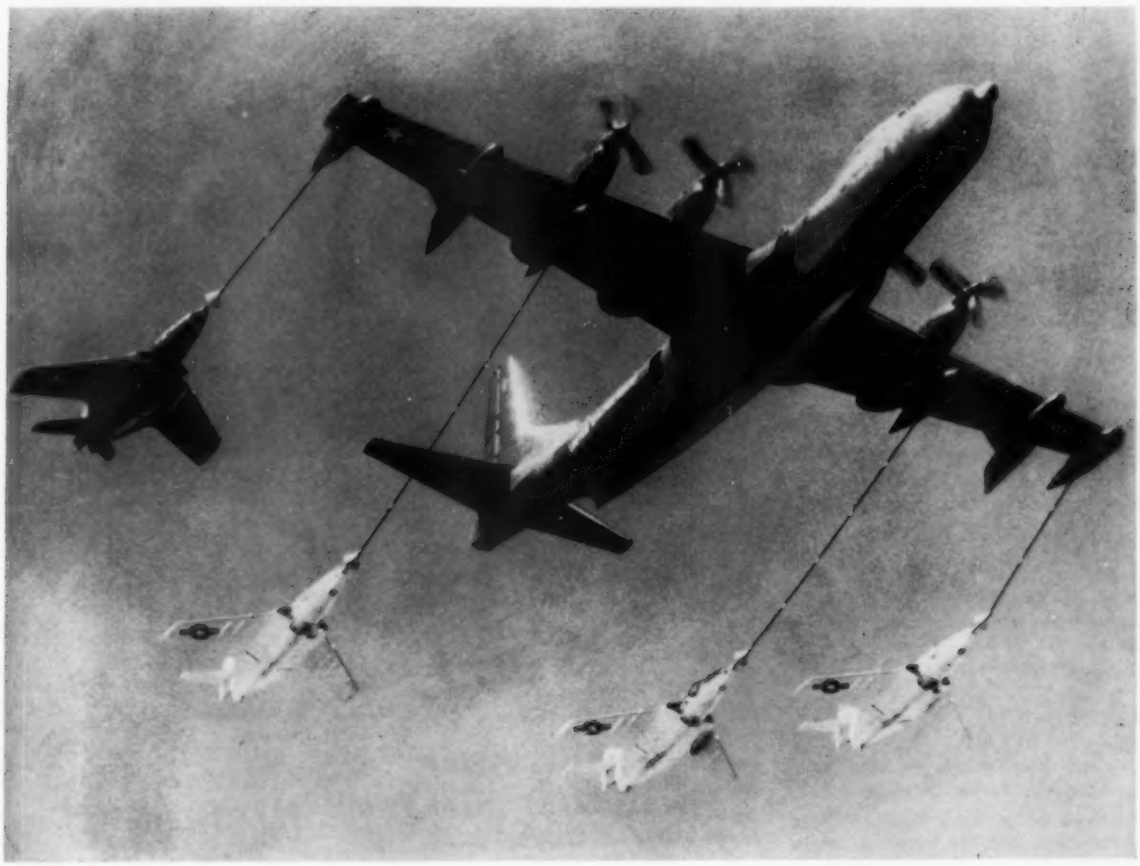
Services for the oil industry

DOWELL

A Service Subsidiary of The Dow Chemical Company

the OIL AND GAS JOURNAL

September 9, 1957



LIKE PIGS AT LUNCH, Navy fighters snuggle close to the big Convair in the first multiple refueling in history from a seaplane. The huge appetites of jet planes mean . . .

Jet Age to Bring Revolution in Fuels

George Weber and John P. O'Donnell

CONVERSION of the aircraft industry from piston planes to jets is well on its way. And a revolution in aircraft fuel demands is coming with the change.

The dramatic changeover is a certainty. Two facts show it:

. . . The U. S. military, biggest user of aircraft fuels, has taken its last piston plane.

. . . Commercial airlines will receive their last ones next year.

The demand for jet fuel already has surpassed avgas even though the transition from piston driven planes to jets is far from complete. But the switch now will be accelerated.

The jet age, though now emerging, is not yet here. Three odd facts help bring the fuel picture into focus.

. . . Estimates of jet fuel demand are being shaved for the next 6 months or a year because of military economy and because commercial planes won't immediately hit the full operational goal set by airlines.

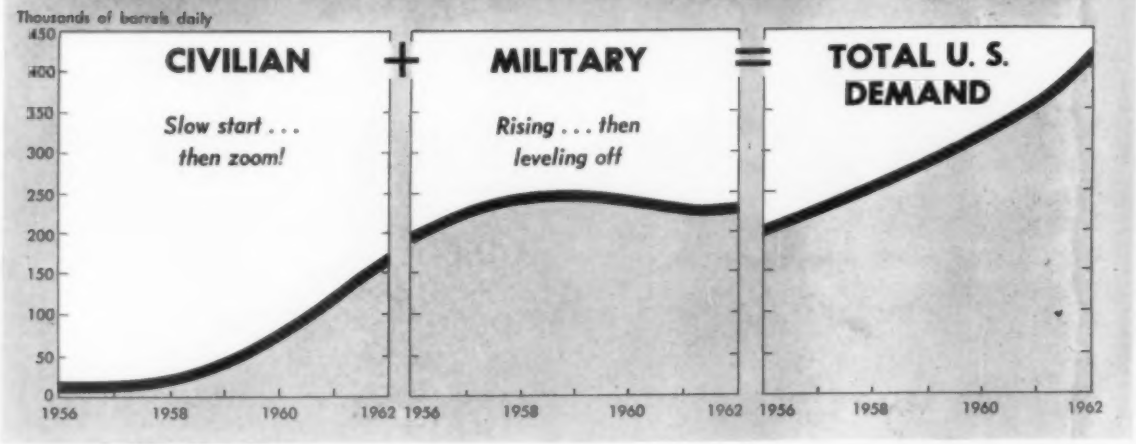
. . . While jet-fuel consumption is bound to rise tremendously in the years ahead, the military demands actually will start dropping off in the 1960's because the missile program will cut the need for manned aircraft operation.

. . . The demand for avgas is not dropping. The military will continue using its piston-powered carrier planes and will convert long-range bombers to tankers. And commercial airlines still have 462 piston planes on order for 1957 and 1958.

Over the long haul, however, the jet plane will rule the skies. And when it does, the demand for jet fuel will be a bonanza for the oil man.

Here's why: Consumption per plane

U.S. Refiners Face Heavy Jet-Fuel Demand



is much greater for jets than for piston-powered planes. The big jets will eat fuel three times as fast, and the bill for one plane alone could exceed $600,000 per year.

Equally important, the jet age will help boost air travel, which should double in the next 10 years.

What kind? . . . The big problem of the petroleum industry, which is delighted with the developing jet fuel market, is not the quantity of fuel required but the kind.

In other words, what will the jet fuel be?

Experts are sharply divided today. Gasoline currently is preferred, but kerosine may be the ultimate choice.

Before considering details of this controversy, the oil industry should first consider the far-reaching implications of the conversion to jet air travel.

What Jets Require

The big jet planes will take up to 22,000 gal. at one filling, use as much as 2,200 to 2,400 gal. per hour, and load up to 1,500 gal. per minute (see table).

Each will use from 6,000,000 to 7,000,000 gal. per year, roughly triple the diet of piston-powered planes.

Some jet engines will produce a horsepower equivalent of more than 20,000. Thus four-engine planes will be driven by the equivalent of 80,000 to 100,000 hp. This is four times as powerful as the turbine drive of an 85,000 deadweight-ton tanker able to carry 600,000 bbl. of crude oil.

These planes will be big and fast. They will haul 120 to 150 passengers and fly 550 miles per hour at altitudes of 25,000 to 40,000 ft.

It's no surprise that the fuel bills of airlines will be substantially higher. Fuel today amounts to 22 per cent of an airline's operating costs, but in the jet age this will rise to 30 or 40 per cent.

But this great increase is not deterring the airlines. They are committed throughout the world to purchase from $3,750,000,000 to $4,000,000,000 worth of jet planes between now and 1963.

The delivery schedule spans the piston-to-jet transition era. This year the number of piston planes to be delivered to airlines outnumber jets by 357 to 156. But next year the jets outnumber piston planes 213 to 105. And in 1959 not a single piston plane is scheduled for delivery. All will be turboprops or pure jets.

Some not convinced . . . Even with this overwhelming weight of evidence, some oil companies still regard the jet era lightly.

Their thinking seems to be influenced by the history of aviation gasoline. They recall that fantastic predictions of postwar demands for avgas fell far short — and for this reason they now look at the jet-fuel predictions with a jaundiced eye.

The two are not comparable. Not only has jet-fuel demand already gone above that of avgas, but the jet era is just getting started.

And consider this: All civilian planes now on order are still subsonic, hitting a top speed of Mach. 0.75 to 0.80. When the yet-to-come supersonic transports arrive, the per plane consumption of fuel will rise drastically. At Mach. 1 or Mach. 2, the consumption will be something like five times avgas consumption, not today's three times.

The Actual Demand

U. S. refiners are preparing for the first major upsurge in commercial demand late next year.

Earlier estimates of military requirements have been cut by an estimated 10 per cent, and the airlines also may not take as much as expected. This means a delay in the schedule of sharply rising consumption by 6 months to a year.

A consensus of several forecasts on U. S. and free-world demand for jet fuels shows a slight backing-off from the same consensus report a year ago (OGJ, Sept. 17, 1956, p. 116).

It now appears that total demand on U. S. refiners will hit 400,000 bbl. per day or more by late 1961, compared with 230,000 to 250,000 today. Of the amount predicted for 1961, an estimated 175,000 will be taken by commercial users.

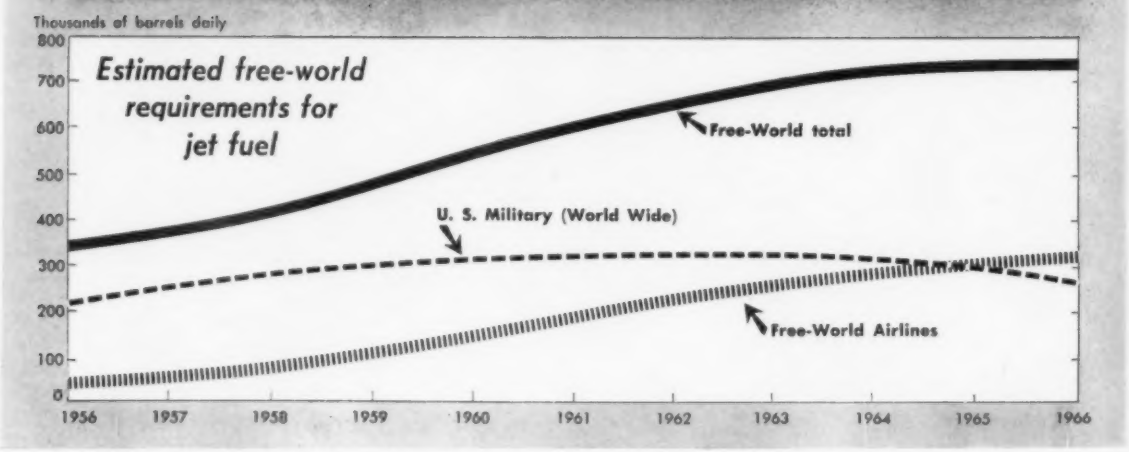
The prediction presupposes that aircraft manufacturers will deliver on schedule, and the airlines will operate the new craft 3,000 hours per year from time of delivery.

The missile effect . . . The U. S. military demand will increase at a slower rate than expected, and in a few years will begin to level off. By the early 1960's the missile program will cut into the use of manned aircraft. First there will be a gradual reduction in interceptor-plane operations and later, as the long-range missiles come into their own, the bombers will become fewer.

This cutback in consumption probably will be felt in the JP-4 type fuels. The kerosine types, while still a small fraction of total military demand, will continue to show gains.

Missiles themselves probably will

World Demand to Rise Sharply Over Decade



use kerosine types for their first stage propulsion. But the large consumption of fuel required for training pilots and keeping them in trim will gradually decline as manned aircraft gives ground to missiles.

The civilian picture . . . The extended future for nonmilitary jet-fuel requirements cannot be forecast with any real accuracy beyond the early 1960's.

The airlines are firmly committed to the use of long-range jets, but how soon they will make a concerted move in converting to jets for shorter hauls is not yet clear.

All surveys of projected commercial business show a rising rate of operation. The Civil Aeronautics Authority sees revenue passenger miles rising from the 20-billion level of 1956 to 30 billion in 1958 and double that by 1970. Air cargo should increase by 50 per cent by 1960.

General flying by business planes, private craft, patrols, and crop sprayers should rise from 10 million hours last year to 18 million in 1968.

The problem is to anticipate how much of this increase in flying will depend on jet fuel and how much on aviation gasoline. It is still too early to predict with accuracy.

JP-4 or Kerosine?

The burning issue with refiners looking down the road is whether gasoline or kerosine will be the jet fuel of the future.

Currently 73.5 per cent of the jet fuel used in the United States is gasoline. Kerosine accounts for 19.6 per cent and distillates 6.9 per cent.

The principle reason for the high use of gasoline is that three-fourths of today's demand is military—and 90 per cent of the military demand is for JP-4, which is predominantly a gasoline.

There is good reason to believe the picture will change. The airlines, now entering the jet picture in a big way, prefer kerosine. Further, when the supersonic plane of tomorrow arrives, kerosine likely will be the choice because it has a lower volatility than gasoline. Volatility becomes increasingly important as ceilings go up.

While this seems like positive assurance that kerosine will get the call, there's little that's positive in jet fuel. For example, today's most widely used plane with the jet principle, the Vickers Viscount turboprop, is operated by Trans Canada Airlines with JP-4 and Capitol Airlines with kerosine.

The military view . . . The military's

Fuel Figures on World's Jets . . .

. . . Douglas, Boeing will have biggest appetites

Type of plane—	Fuel capacity (gal.)	Consumption per hour (gal.)	No. fueling points	Fueling rate per minute (gal.)
Bristol Britannia	10,500	600	2	360
Lockheed Electra	5,360	725	1	300
Fairchild Friendship	950	225	2	
Vickers Viscount (700)	2,340	420	2	340
Vangard	6,120	700		
Convair 880	10,700	2,000	4	1,000
DeHaviland Comet 4	10,500	1,700	2	532
Douglas DC-8 (Domestic)	17,000	2,200	4	1,000
Douglas DC-8 (International)	22,000	2,200	4	1,000
Boeing 707-120	13,500/17,400	2,200	4	1,250
Boeing 707-120 (Amer. Air.)	15,500	2,200	4	1,550
Boeing 707-320	21,200	2,200	4	1,250

Data from Aviation Technical Service Committee A.P.I. Consumption figures are estimates.

World-Wide Civil Aircraft Orders . . .

. . . No more pistons after '58; from then on—jets

Type—	For delivery 1957	1958	1959	1960	1961	1962	1963	Total
Long range piston powered	280	84	0	0	0	0	0	364
Medium range piston powered	77	21	0	0	0	0	0	98
Medium range turboprops	123	155	32	0	0	0	0	310
Long range turboprops	33	42	105	38	10	0	0	228
Medium long range pure jets	0	16	109	196	13	0	35	369
Totals	513	318	246	234	23	0	35	1,369

Data from Adjusted Esso Air World Survey.

JP-4 and Kerosine—How They Compare

Specification—	JP-4	A.S.T.M. kerosine type	British kerosine type
Gravity, °A.P.I.	45-57	39-51	50-51
Freezing point, °F., max.	—76	—40	—40
Aromatics, vol. per cent, max.	25	20	20
Olefins, vol. per cent, max.	5		5
Smoke point, mm., min.		20	
Smoke volume index	54		
Burning test, 16 hours		pass	
Existent gum, mg./100 ml., max.	7	7	3
Accelerated gum, mg./100 ml., max.	14	14	6
Sulfur, total weight per cent, max.	0.4	0.3	0.2
Mercaptan sulfur, weight per cent, max.	0.005	0.003	0.005
Heating value, net B.t.u./lb. min.	18,400	18,400	18,300
Flash point, °F., min.		legal—150	100
Pour point, °F., max.		—40	
R.v.p., psi.	2-3		
Viscosity, cs. at —30° F., max.		15	*6
Water tolerance, ml., max.	1	2	1
Color, Lovibond, max.			4.0
Corrosion, copper strip, max.	pass	1	1
Thermal stability			
Distillation:			
10 per cent min. evap. at, max.		400	
20 per cent min. evap. at, max.	290		392
50 per cent min. evap. at, max.	370	450	
90 per cent min. evap. at, max.	470		
Final boiling point, °F.		550	572
Residue, volume per cent	1.5	1.5	2.0
Loss, volume per cent	1.5	1.5	1.5
Oxidation inhibitor added	Option	Yes	Option
Corrosion inhibitor added	Yes	Option	Option
Metal deactivator added	Option	Option	Option
Acidity		Yes	0.1

*Viscosity, cs. at 0° F. Total acidity, mg. KOH/gm.

choice of JP-4 is based primarily on its greater availability.

Maximum kerosine yield from crude is about 25 per cent. Normally it is much less. Maximum gasoline yield is about 50 per cent. A combined yield of the two can be as much as 60 per cent. Thus, JP-4, about 70 per cent gasoline and 30 per cent kerosine, has a degree of availability about as high as a petroleum-based fuel can have.

Another thing that has contributed to the abundance of JP-4 is the heavy demand for high-octane motor gasoline. This makes more low-octane material available for jet fuel.

The issue of B.t.u.'s enters the argument over gasoline-vs.-kerosine, and the choice is just about a tossup. Gasoline has a higher B.t.u. content per pound, but kerosine has more on a volume basis.

This means that if an aircraft can afford more space for fuel, its choice will be JP-4. If it can more easily take on added weight, it will favor kerosine. Airlines are bending toward the latter.

Specification battle . . . Specifications for kerosine are gradually being refined and tightened. But they still are not meaningful and serve more as a guide than an absolute standard.

The latest revision by the American Society for Testing Materials shows a number of changes from a year ago—and more are coming.

Today's specifications set the freezing point for kerosine at a maximum of —40° F. That's good enough for most of today's turboprops—but not for Trans Canada's Vickers Viscount, which encounters severe weather. This accounts for T.C.A.'s preference for JP-4.

Operators of the Bristol Britannia now want a —58° F. freezing point. Boeing and Douglas want it brought down, too. They relate it to pumpability which they would like to see at —67° F. to —70° F. A —58° F. freezing point kerosine would just about meet this requirement.

But if the freezing point is cut, the cost of producing a tailor-made kerosine will rise.

Another unsettled specifications issue is smoke point. Today's A.S.T.M. spec sets the smoke point at 20 mm. But one aircraft manufacturer wants it set at 25 mm. to cut down on engine overhauls and air pollution.

Aromatics content also is a factor in smokiness and explains why highly aromatic crudes are less desirable as a source of aviation kerosine.

Opinions differ on specifications for mercaptan sulfur. A.S.T.M. limits currently are 0.003 weight per cent maximum. The military probably will want this cut to 0.001. Some manufacturers are down to 0.0015—but only at the cost of more severe processing. Mercaptan sulfur is an enemy of fuel tank sealants.

Still another specification clouded by uncertainty is thermal stability. While not yet of serious concern, it could become critical when planes with high cruising speeds develop.

More problems . . . The oil industry must adopt a "wait-and-see" attitude toward future jet fuels. The manufacturers and operators will make the decisions. But it's certain they will try to keep the number to a minimum because multiple fuels mean multiple costs.

Already the nation's airports supply from four to nine grades of aviation gasoline.

Adding JP-4 and aviation turbine kerosine means additional tankage, piping, outlets, trucks, and the like. And airport fueling systems are not cheap. Fort Worth's Amon Carter field has a new installation that cost $1,000,000. It will service 24 gates.

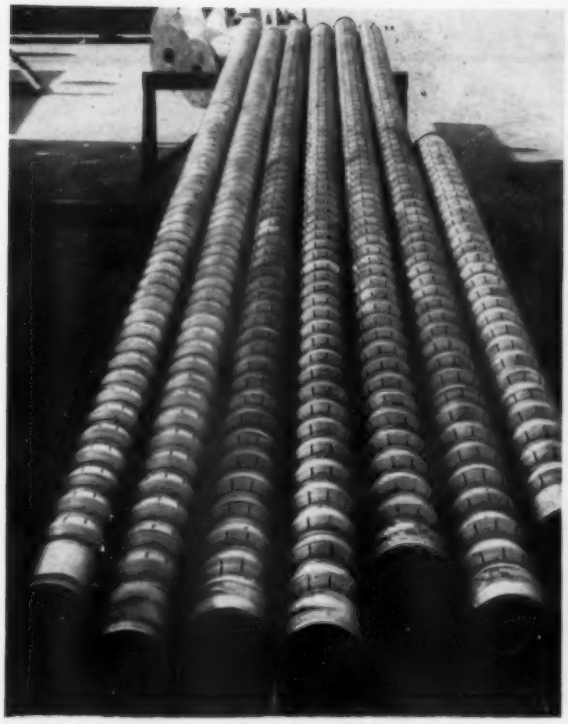
Storage and handling of kerosine turbine fuel is a distinct problem. The fuel must be exceptionally waterfree and clean. Kerosine has a greater tendency to retain water than does gasoline, and its relatively higher viscosity means it must have a settling schedule two to four times that of gasoline.

Exceptional filtration also is essential. Turbine fuel must be kept free of suspended matter, and in some systems the fuel is filtered three or four times between storage and delivery to planes. Some airlines want fuel filtered to 5 microns, and at least one is asking for 2 microns.

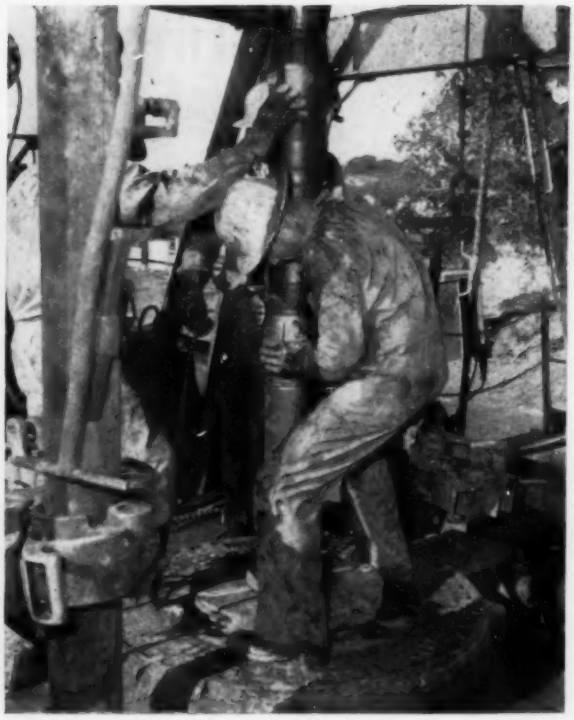
Summing up . . . It all adds up to a rather strange picture. There's going to be a big demand for jet fuels, but nobody knows exactly what the jet fuels will be.

But this is understandable when it is realized that the jet plane, the jet engine, and the jet fuel are being developed simultaneously. The relationship of one to the other is not fully known and will remain obscure until some degree of uniformity is established.

Then, and only then, will it be possible to establish rigid specifications. Until that time arrives, jet fuels will keep right on changing in type and growing in demand.



Newly developed liners look like a stack of convex baskets when lined on pipe rack...



California tests show they produce more crude, less sand than conventional liners.

New Liner Features Double Wall

LOS ANGELES.—An unusual new type liner has shown in field tests in a coastal California well that it may be a valuable tool where sand control and pipe collapse are problems.

The liner is known as Fether pipe. It's made by the Fether Manufacturing Co., Los Angeles.

Success of the liner is attributed to its two-wall design. This double-wall effect is achieved by:

...A standard slotted liner serving as the inner part.

...An outer wall gained by welding short convex-shaped forged perforated sections to the inner pipe.

This convex shape and double thickness at intervals give the liner much greater strength than conventional perforated liners.

In addition, higher oil production and less sand are experienced with the liner. The reason is this: Perforations are only in the top portion of each convex section. In this position, they are not plugged when the liner is run. With all slots open, the oil flow through the perforations is more uniform. This leads to more uniform velocities and less sand movement and abrasion.

What tests show . . . The first string of the new liner was run 5 months ago by Douglas Oil Co. in West Cat Canyon field near Santa Maria.

About 300 ft. of 5-in., i.d., 7⅜-in. o.d. pipe was set in a redrilled well which produces 10°-gravity crude. The outer perforations were 180-mesh, 2-in. slots spaced 18 per foot. Those on the inside were 200-mesh, spaced 36 per foot, and radially in line with perforations in the convex sections.

The old hole had yielded small amounts of crude and a minimum of 35 per cent sand through 60-mesh perforations. Because of the high sand cut and resulting hole caving, operator was forced to pull the well nearly monthly to keep it producing.

During the 5-month production test with Fether pipe in the redrilled hole, only 1 per cent sand was produced along with much greater oil.

The sand produced was so fine that it remained in suspension in the produced oil. Tests showed that no sand had accumulated in the hole. It was possible to lower pipe to redrilled total depth.

Encouraged by the first test, Douglas late in August drilled a new 3,790-ft. well and equipped it with a similar liner. After only a short observation period, the company expects to drill more wells in the field.

Tests watched . . . The unusual type pipe was designed by Don Fether.

Its development and performance in West Cat Canyon have been closely followed by engineers of several major oil companies.

Fether said he anticipates the pipe will be particularly useful in sand-control jobs, although it may prove to have other field uses.

Tests indicate the secret of its sand-control record is this: By causing uniform low rates of oil flow from the formation, sand will not be moved to the well bore.

Sand in the bore either plugs off oil production or enlarges some perforations so much that liner failure results.

Besides, the Fether pipe offers another advantage: If there is an earth movement or unequal loading results from sand sloughing, design of the pipe offers maximum resistance to collapse.

Import Hearings Begin

Tidewater case is major test of new volunteer program; four protests scheduled for Carson's docket first week

WASHINGTON. — Tidewater Oil Co. goes before import administrator M. V. Carson, Jr., this week to plead for a 52,200-bbl. increase in its import quota. The hearing will test the rigidity of the Government's new voluntary control program.

Tidewater is one of four importers whose protests to the quotas will be heard during the week by Navy Captain Carson.

Standard Oil Co. (Ind.) will be the first to face Carson, but most of the attention is on Tidewater, second up.

Next week two and possibly three more companies will be heard. About half the importers who originally protested their quotas, however, have not yet asked for hearings.

What could happen . . . The Tidewater case involves a drastic increase which, if granted, could reshape the entire import picture. The company had planned to bring in 84,600 bbl. daily, but its quota was set at 32,400.

Because of the barrelage involved, the Tidewater case is arousing the most interest. It presents two big questions: Can the company make a case for the increase it asks? And, if it doesn't get the increase, will it go along with the voluntary program at all?

There appears to be no room in the quotas for any increase in individual allowables without lifting the 756,000-bbl. ceiling set for imports east of the Rocky Mountains.

There is a possibility, however, the ceiling may be bulged slightly to take care of a few small importers not on the cabinet-committee list. The list provided quotas for 22 companies, but there are actually about 36 importers.

Not all of the additional 14 plan to import, however, and those that do will total only an insiginificant volume.

Others on docket . . . In addition to Tidewater and Standard of Indiana, those on this week's hearing schedule are Standard Oil Co. (Ohio) and International Refineries, Inc.

Two hearings have been scheduled for next week. Northwestern Refining Co., protesting its 10,000 bbl. quota, will be heard September 16. Eastern States Petroleum Co., asking for an increase of 4,500 bbl. above its quota of 18,300 bbl. daily, will be heard the following day.

In addition, a hearing may be set for Sinclair Refining Co. The company submitted its suggestion for a hearing date last week. It wants its quota increased from 62,200 bbl. daily to the 74,600 bbl. it planned for the last half of this year.

What about newcomers? . . . Meanwhile, a new problem in handling the import program is developing because of would-be new importers.

Several interests already have explored the chances of getting quotas for imports next year. So far, however, no definite plans have been sent to Washington.

The cabinet committee outlined the manner in which room should be made for new importers. They may be given quotas out of the additional imports made possible by an increase in domestic demand. But if this is not sufficient, older importers may be asked to reduce their imports to make way for the newcomers.

Since the plan calls on new importers to submit their schedules at least 6 months in advance, the issue will not become concrete before next March. But some officials here see a serious problem raised if the list of importers has to be broadened.

Will there be room? . . . There is a question in some quarters whether domestic demand will increase over the next few months to a point that would give any room for higher imports.

The cabinet committee's production estimates were brought up-to-date only a few days before the program was announced last month and are believed to cover the probable output up to next June 30.

The situation could become very bad if new importers showed up in any number. It could reach a point where some importer, irked with the treatment he received, might go ahead with his planned imports, regardless of the objective of the program.

Such action could wreck the plan and bring about formal controls. These would be at least equally as stiff as present quotas. Officials are hopeful the industry itself will see the danger and refrain from any action that might upset the applecart.

Louisiana Orders Ratable Take

BATON ROUGE.—Louisiana for the first time is attempting to require ratable take of oil from a field.

Conservation Commissioner John B. Hussey issued the precedent-setting order last week. It attempts to force Sun Oil to buy equitably from all producers in University field of East Baton Rouge Parish. The order is similar to controversial decrees now pending in Texas and Oklahoma courts.

Hussey's long-delayed order had been under consideration since July (OGJ, July 22, p. 53). It was requested by T. G. Markley, Baton Rouge independent oil operator.

Markley, one of the producers in University field, charged that Sun had declined to take his production of some 380 bbl. a day. But the company still buys from other operators in the field. He has been storing his production there for the past 2 months.

A Sun Oil spokesman admitted the company had bought the Markley production for several years. He said, however, that the production was diverted from Sun and sold to an independent refiner at a premium price while crude was scarce.

After crude again became plentiful and Markley lost the temporary market, Sun refused to take his production. Sun continued its purchases from the William G. Helis estate, operator for several producers in the field.

Although Sun made no official announcement after receiving the Hussey order, speculation was the company might discontinue all purchases in University field. A company spokesman at the July hearing questioned the state's legal authority to enforce ratable take.

Markley contended that discriminatory purchases are unfair to him and the royalty owners affected. He claimed that oil from his lease will be drained through offsets if he is forced to shut in his wells.

In issuing the mandatory-purchase order, Hussey noted that Sun had been buying less oil in the field than it had nominated for purchase in advance.

The ratable take order would require proportionate purchases from all producers as determined by the conservation department.

Unions Teaming Up

Head of chemical union favors O.C.A.W. merger

DENVER. — Negotiations will be opened soon for merger of the 80,000-member International Chemical Workers Union with the 105,000-member Oil, Chemical and Atomic Workers International Union.

Barriers to uniting the two organizations were knocked over at O.C.A.W.'s recent Chicago convention when I.C.W. President Walter Mitchell told delegates that merger of the unions "is not only the road to prosperity but also the road to survival."

The convention immediately adopted a resolution directing O.C.A.W. officers to "negotiate and bring about an honorable and favorable merger" with I.C.W.

"We are colleagues in the united house of labor and soon it is hoped we may be full partners," Mitchell said. "I believe that day is not too far off."

He estimated there are 750,000 workers in the chemical industry, with only about 200,000 organized in O.C.A.W., I.C.W., and District 50 of the United Mine Workers. Many of the 550,000 unorganized chemical workers are employed by companies in which O.C.A.W. also has members.

"We need new techniques in organization to win over this membership," Mitchell declared. "The chemical industry is by and large a small-plant industry and it's expensive to organize. The leading chemical companies shop around for the best labor bargains they can get—and they do it because we don't present one united front to those companies."

The I.C.W. president suggested that a conference be held early next year of all unions representing chemical employes to study the merger.

Gas Men Protest Red Tape

WASHINGTON.—A strong protest against a plan requiring that detailed financial reports be filed with the Federal Power Commission was lodged last week by independent gas producers.

A number of producers have told the FPC that the proposed new report form would impose a heavy burden on them. They backed up these protests at hearings opened by the commission last week.

The FPC called for reports last year, covering 1955 sales and revenue. It is now planning to call for additional financial and rate data in a report covering 1956 operations.

watching WASHINGTON

. . . with Bertram F. Linz

Of importers and imports . . .

IMPORTERS will get their first chance to take a crack at their 1957-58 import quotas this week.

Pleas that the quotas were set too low and don't take account of increased imports planned for the first half of 1958 will be laid before Navy Capt. M. V. Carson, Jr., administrator of the plan, in a series of hearings which may run several weeks. (See opposite page.)

Carson will have the job of weighing these claims against the quotas of other importers. He will report to Interior Secretary Seaton whether there are any "inequities" in the individual allowables set last month. Seaton then will decide whether any increases should be granted.

The aim of the Government is to keep imports east of the Rockies to a ratio of 12 per cent of domestic output. So higher quotas hinge pretty strongly on how much domestic production will increase from here on. Too big increases to too many companies could pierce the ceiling set in the plan.

But the big question, some observers say, is what protesting importers will do if they don't get the relief they ask. The program is voluntary, so they could refuse to go along with it. Sun Oil Co. already has refused, although on different grounds.

If enough companies pulled out, the program could founder. Then it would be tossed back into the lap of the President for formal controls which probably would be equally as tough. The industry doesn't want that, so the chances are better that an acceptable, if not entirely satisfactory, arrangement will eventually be reached.

Offshore getting more so . . .

INTERIOR officials see offshore lessees in the Gulf of Mexico working as far out as the 40-fathom line within the next year or two.

Already, they say, there have been inquiries whether the department has maps of the outer Continental Shelf beyond the limits of present maps.

The next sale of leases, possibly fairly early next year, may involve tracts at greater depths than offered so far. The department plans to extend its lease block systems to include deeper waters and there are proposals to carry on a gravity program to depths of 250 ft.

Operators already have found they can handle drilling beyond the 100-ft. depth and more than 40 miles from land. Officials are confident that they will develop techniques for much deeper waters, some day even as far out as the 600-ft. edge of the shelf.

Pinning down the coast line . . .

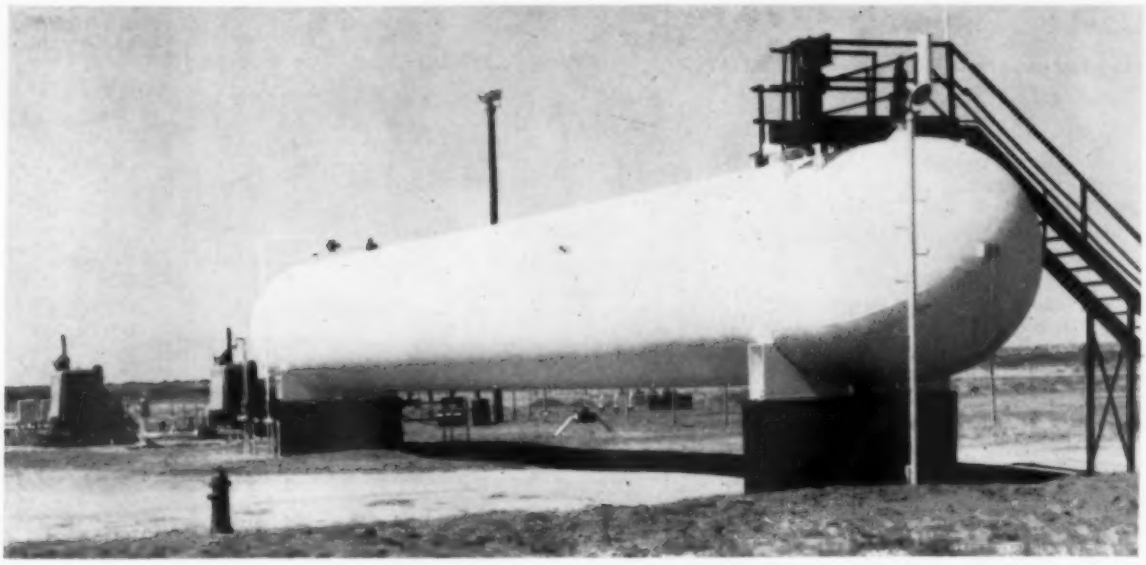
A FEDERAL-STATE committee is trying to define Louisiana's coast line.

Louisiana's claim to a 3-league boundary in the Gulf of Mexico will be tested in the U. S. Supreme Court in a matter of months. Regardless of whether the court gives the state 3 miles or 3 leagues, it will be necessary to fix the coast line as a basis for measurement.

Louisiana claims not only a 3-league boundary but also a coast line running around the outer edge of offshore islands. The federal Government contends that the line hugs the coast of the mainland. At some points the difference could be well over 20 miles.

It is this difference in coast-line claims that resulted in the "twilight" zone in which neither the state nor the federal Government is issuing oil and gas leases. If federal and state officials cannot agree on the line it will be necessary for the Supreme Court to appoint a master to set it.

A similar joint group has been named to study the seaward limit of California. This committee, however, will have a second job also. It is to discuss matters relating to the development of oil and gas in areas in dispute under the Outer Continental Shelf Act.



This propane-storage tank is emptied six times a day into injection wells as . . .

Biggest Propane Flood Hits Its Stride

Magnolia is injecting 7,300 bbl. of propane daily, will switch to gas within a year. Its biggest hope: That production won't pick up for at least a year and a half

THE WORLD'S BIGGEST miscible-phase displacement project is going full blast in Parks Pennsylvanian field in West Texas.

Already the $3,500,000 recovery project has consumed more than half a million barrels of propane. And Magnolia Petroleum Co., as operator of the big 8,160-acre Parks unit, is pouring more propane down into the 10,400-ft. Bend section of the Pennsylvanian pay at a rate of roughly 7,300 bbl. a day.

All but three of the 25 projected input wells are in service. The rest soon will be.

During the next 9 months to a year, the unit will pump at least 1,500,000 bbl. of propane, probably more, into the Bend. Then it will switch over and inject about 16,000,000 cu. ft. of gas a day to keep the miscible zone moving through the reservoir.

Big dividends . . . Magnolia believes the program will lengthen field life from 6½ years to about 12 years and increase oil recovery by 100 to 150 per cent.

Primary production from the pay has been estimated by Magnolia at about 15,000,000 bbl. The miscible drive thus would kick this up eventually to between 30,000,000 and 40,000,000 bbl. And the unit expects to reproduce about 90 per cent of the injected propane.

The prospects for such a recovery using the propane-slug type of miscible drive influenced the unit to go this route rather than to expand a pilot water flood now performing quite satisfactorily in the west part of the field.

Delayed response hoped . . . Magnolia doesn't look for, and in fact hopes against, any quick reaction to the flood of propane being forced into the Bend pay.

One official told the Journal he hopes that the reservoir doesn't respond to the program for 18 months after the start of gas injection.

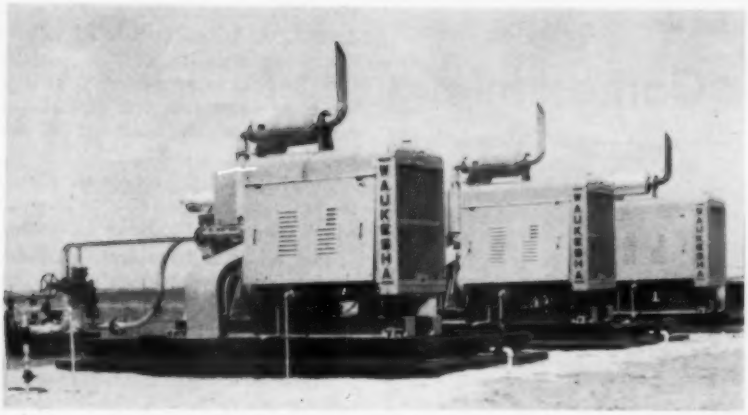
He points out that there is a lot of empty pore space in the reservoir that must be filled. "If we should get early cuts in gas-oil ratios or increases in production, it likely would mean that the drive was channeling rather than moving steadily and evenly on a broad front."

Injection smooth so far . . . Most of the propane now being injected is coming from El Paso Natural Gas Co.'s big Midkiff natural-gasoline plant about 20 miles east of Parks in Spraberry Trend area field.

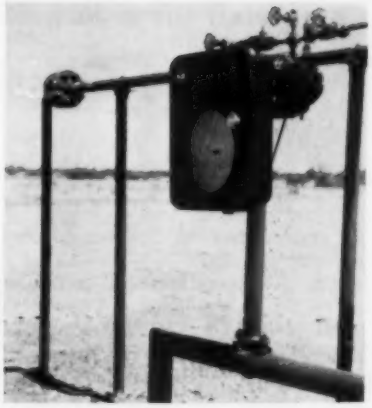
The unit is buying about 4,000 bbl. daily from El Paso and moving it to Pegasus field through a new 4-in. line. All told, the Parks unit will buy 800,000 bbl. of Midkiff product from El Paso. At Pegasus, the unit picks up the rest of its needed daily supply of propane from the Pegasus natural-gasoline plant. Part of this is Parks field product, since the Pegasus plant, also operated by Magnolia, processes casing-head gas produced from both Pegasus and Parks fields.

The total propane flow then moves north through an existing line laid to Magnolia's Ward Warfield L.P.G. loading rack. Before reaching the rack, it is detoured into a new line running due east to Parks field.

The propane arriving at Parks booster station enters a huge 1,200-



1. Injection pumps take propane from five-stage booster pump at 210 psi., lift the pressure to 1,690 psi., force propane through field lines to input wells.



2. Propane is metered, choked to proper volume at manifold near each input.

3. Trouble-shooter pump serves problem wells. If an input won't take its share of propane at 1,690 psi., this pump is moved in to boost pressure as high as 3,000 psi.

4. Injection well takes roughly 350 bbl. of propane daily, later will switch to gas.

bbl. storage or surge tank. Pressure in the 10-ft.-diameter, 82-ft.-long tank is about 185 psi.

Leaving this tank, the propane moves through a five-stage, centrifugal booster pump driven by a 5-hp. motor. The booster pump discharges the propane at about 210 psi. en route to the project's three big main pumps.

These are 2¼-in.-diameter, 5-in. stroke triplexes with a maximum capacity for pumping 2,600 bbl. daily each at 360 r.p.m. Each is driven by a six-cylinder, 6¼ by 6½ gas engine with 1,197-cu.-in. displacement. Horsepower rating of each is slightly under 100. The main pumps discharge the propane at a pressure of 1,690 psi. into a network of distribution lines to the input wells.

The propane is metered at each input and the flow volume controlled by adjustable chokes.

The unit has found that some of the input wells won't take the desired amount of propane at the normal 1,690-psi. input pressure. To counter this, it is using a trouble-shooter booster pump.

This pump, though small and portable, boosts input pressure to a maximum of 3,000 psi. The unit moves it here and there throughout the field, hooking it up to reluctant injection wells until they catch up to their input quotas.

Gas plans . . . Wells now used for propane injection will also inject gas when the gas phase starts. The gas will come mostly from Parks field, with some from Pegasus or perhaps other fields.

Parks casing-head gas is now compressed by the field booster station and pumped through a 6-in. line to the Pegasus gasoline plant about 15 miles to the south.

After all propane has been injected, the Parks gas will be kept at home. And flow through the line to Pegasus likely will be reversed to bring in added injection gas from that field.

Eyes on results . . . The Parks project during the next few years will be one of the most closely watched oil-recovery operations in the country.

Operator interest in the miscible-phase method of recovery is getting hotter by the day, largely because of spiraling oil-finding costs and the resulting urgency to find a practical way of recovering more already-found oil.

More and more miscible-phase projects are being launched each month. And a majority of the operators appear to be settling on the propane slug as the preferred type of miscible drive.

The Parks project not only is the first field-wide test of this technique, it also is the largest yet of any type of miscible-phase operation. Since it is the first full-scale propane-slug effort, it should also be one of the first to get results.

Completed on emergency basis:

Wild Gasser Comes in Big

PORT ARTHUR.—A prolific Jefferson County discovery, which blew out when it hit a high pressure gas-distillate sand, has been completed on an emergency basis and turned into a pipeline system.

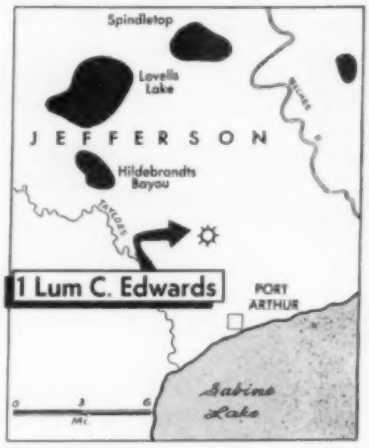
The discovery, Meredith & Co. et al 1 Lum C. Edwards, produced gas at a daily rate of 16,478,000 cu. ft. through ½-in. choke. It also flowed about 51 bbl. of distillate per million cubic feet of gas for a daily potential of 838 bbl.

Byron Meredith, president of Meredith & Co., said the discovery is on a 620-acre tract. It is a joint operation, but partners in the venture were not identified.

Location is about 3 miles northwest of Port Arthur and 4½ miles from Hilderbrandt's bayou field. It is in William McFaddin Survey 8, A-418.

The well blew out about mid-August when the bit hit the top of the Hackberry sand at 10,534 ft. It was capped several days later by M. M. Kinley Co., which installed a manifold. But the high pressure and resulting leaks in tool joints made it impractical to attempt to shut off the flow.

A connection was quickly laid from the well to United Gas Pipe Line Co.'s gathering system some 500 ft. away, and the flow was diverted into the pipeline. Last week, after the choke had been reduced to ⅜-in., Meredith said, the well was flowing about 10,500,000 cu. ft. of gas per day into the pipeline.



The well is producing from open hole through 2⅞-in. drill pipe. It has been cased with 7-in. pipe to 9,095 ft., more than 1,400 ft. above present total depth.

Plans call for producing the well until bottom-hole pressure drops enough to permit permanent completion. The rig has been moved to another location.

The operator was using 16½-lb. mud when the blowout occurred. This would indicate a bottom-hole pressure of about 9,000 psi.

Gas-liquid ratio of the well was reported at 19,646:1. The distillate tested 48.8° gravity.

Sooner wildcat looks like champ:

Sterba May Go to 24,000 Ft.

OKLAHOMA'S record-breaking wildcat is a step closer to becoming the world's deepest hole.

Magnolia Petroleum Co. is already below 20,043 ft. at the 1 Sterba-Ordovician in Cement field of Caddo County and is talking about taking the hole to 24,000 ft.

Company geologists feel that the target—the Bromide sands of the Simpson section—is still 2,000 to 4,000 ft. off. If Magnolia's six partners in the project agree, the hole will continue to the objective.

Big Chief Drilling Co., Oklahoma City, which has the contract, has already assured Magnolia it could carry the 6⅝-in. hole to 24,000 ft. if necessary.

The 1 Sterba had been in shale almost continuously since the last string of 7⅝-in. casing was set at 14,527 ft. But last week, the wildcat topped the Sycamore lime at 19,970 ft., and was making hole at the rate of about 30 ft. per day.

At 20,043 ft., the 1 Sterba was almost 1,900 ft. deeper than the previous deepest hole in the state, Frankfort Oil Co.'s 1 Pruitt, an 18,158-ft. dry hole completed in Grady County last year.

Now the wildcat is threatening to take the title from the world's deepest hole drilled by Richardson & Bass et al. at their 1-L Humble-L.L.&E. in Plaquemines Parish, South Louisiana. This well was bottomed at 22,570 ft.

Slant-hole complications . . . The more than 5,500 ft. of open hole in the Sterba was standing up well, but the operators have another worry. The bit has been allowed to drift upstructure off vertical to the northeast all the way from the surface.

The bottom of the hole is nearing the boundary of the 160-acre lease on which the surface location is spotted.

The Simpson formation lies thousands of feet deeper than was anticipated by Magnolia. The target was originally expected at or above 15,000 ft.

The company has taken an unusual step in asking the Oklahoma Corporation Commission for a well-spacing rule before it has found production. The commission has set hearing on September 19 for Magnolia's request for 640-acre spacing for the Simpson section.

Before the well was spudded, Magnolia formed a drilling unit with adjoining lessees which takes in the major parts of three sections—34, 35, and 36-6n-10w.

Magnolia has nearly 50 per cent interest in the well. With Phillips Petroleum Co., it holds the bulk of the interest. Other partners are Sunray Mid-Continent Oil Co., Gulf Oil Corp., Pan American Petroleum Corp., Phillips Chemical Co., and Anderson-Prichard Oil Corp.

Record Deepens

Texas title holder passes 20,000 ft., still drilling

FORT STOCKTON, Tex. — Pan American Petroleum Corp.'s 1-CS University in Pecos County, West Texas, churned on down to 20,050 ft. last week, setting a new Texas depth record with every foot drilled.

Progress was steady, with the big Parker Drilling Co. rig on the project chalking up 30 to 45 ft. of new hole daily.

At midweek, the remote wildcat was almost 1,000 ft. below the former deep-drilling record in Texas—19,060 ft., set by Magnolia Petroleum Co.'s 417-A West Ranch in Jackson County on the Texas Gulf Coast.

At last week's depth, the operator was still drilling in shale believed to be the Barnett formation of the Mississippian. Pan American is looking for the Devonian on a contract extended recently to 20,200 ft.

The well may go 500 to 1,000 ft. deeper if the Devonian isn't found when the hole reaches its projected depth and provided heavy hole caving doesn't set in.

Texas producers seek new law as . . .

. . . Proration Fight Heats Up

DALLAS. — Aroused Texas independent producers, already hammering hard for additional crude outlets, are training their big guns on two more fronts in their war against pipeline proration.

Smarting under record-low allowables and proration by three major crude buyers, the producers are:

. . . **Putting together a bill** aimed at tightening up Texas ratable-take laws and knocking the common-carrier pipelines and crude-gathering firms out of their so-called role as "middlemen" in the crude-buying picture.

. . . **Taking a close look** at possibilities of antitrust proceedings aimed at divorcing crude buyers from subsidiary common carriers.

Ramrodding the new all-out attack are four independent producer groups, the Texas Independent Producers and Royalty Owners Association, West Central Texas Oil and Gas Association, North Texas Oil and Gas Association, and Panhandle Producers and Royalty Owners Association.

While the antitrust angle is still under study, a rough draft of the proposed bill has already been blocked out. The bill will be whipped into final shape at another meeting of the producer group in the near future.

As soon as this is done, the producers will start a hunt for sponsors. In Texas, such legislators shouldn't be hard to come by. The independents swing a lot of weight in many producing areas. They are shooting for the next session of the legislature to get their bill across.

Primary aim . . . A top independent spokesman told the Journal last week the bill would "eliminate the middleman" between the producer and the firm which buys the oil.

The producers are not saying just how they would do this, but indications are their bill will shoot for the same goal as the antitrust action—divorcement of common carriers and crude buyers.

The buyer-pipeline tieup, the spokesman said, is the key in the "present breakdown of Texas ratable-take laws." The middleman, he said, is the common-carrier pipeline, universally controlled by the big crude buyers but operated as a separate entity. While the crude-gathering firms will also come under fire, the common-carrier setup will be the main target.

The producers also indicate that their bill would amend present ratable-take statutes to require specifically that common-purchaser oil firms:

. . . **Buy ratably all oil tendered** along pipelines where the lines now buy. The producers say this would eliminate the present practice of companies buying at full allowable from fields in which they own production while practicing pipeline proration and severance in others along the same line.

. . . **Cut their own production** statewide in the same proportion below allowables as they or their affiliates cut purchases from other producers.

Connections wanted . . . The skirmishing started early this year when five Texas-producer groups petitioned the Texas Railroad Commission to order common-carrier crude lines to hook up all unconnected wells and expand trunk and gathering systems in the state.

They charged that major companies were throttling Texas oil production deliberately so as to use more of the cheaper imported oil.

The action before the commission is not yet resolved. Producers plan to file briefs soon. The pipeliners will follow with answering briefs. Then the commission will study the briefs and listen to oral arguments before making any decision. The proceeding likely will drag out to late fall.

Premium Ends Record Climb

THE TRADITIONAL summer slump has apparently caught up with octanes. Premium grades leveled off in July and dropped slightly in August, ending one of the swiftest climbs on record.

According to Ethyl Corp.'s monthly survey, the national weighted average for premium octane in August was 98.1 numbers, research method, down 0.1 number from July and June.

The average for regular in August was 90.9 octane, unchanged from July and down 0.1 number from June.

In four big jumps since February, premium averages increased 0.9 number. The leveling off was believed to be the result of refiners pulling light ends out of their gasoline during the summer months. These light ends evaporate easily in hot weather, causing vapor locks in automobile engines. The climb is expected to resume in the fall.

The August survey showed that the gap between premium and superpremium grades continued to grow slimmer. Nineteen suppliers were marketing 99 octane or higher premium in one or more cities. And premium in this range was spreading. There were 116 samples in the 99.0 to 99.9 bracket in August, compared to 103 in July.

There were eight 100-plus premium samples picked up in August against seven in July. But the arithmetical average of the August samples was 100.3, compared to 101.2 in July.

In superpremiums, the story was the same. In August, 37 samples of third-grade brands showed up compared to only 34 in July. But the July average was 101, while the August average slipped to 100.8.

The biggest jump during the past 12 months came in the Midwest, where many cities showed premium increases ranging from 2.0 to 2.6 numbers.

The following table shows how the August 1957 averages compared with the previous month and with a year ago.

PREMIUM

(Cities per octane group)

	August 1957	July 1957	August 1956
92-92.9	0	0	0
93-93.9	0	0	2
94-94.9	1	2	2
95-95.9	2	1	1
96-96.9	0	0	21
97-97.9	12	12	27
98-98.9	40	40	0
99-99.9	2	2	0
Total cities	57	57	53
Weighted avg. R.O.N.	98.1	98.2	97.0
Weighted avg. TEL, ml./gal.	2.62	2.62	2.60

REGULAR

(Cities per octane group)

	August 1957	July 1957	August 1956
81-81.9	0	0	1
82-82.9	0	0	0
83-83.9	0	0	0
84-84.9	1	1	0
85-85.9	0	1	1
86-86.9	1	0	9
87-87.9	2	3	2
88-88.9	10	9	12
89-89.9	18	15	10
90-90.9	5	8	2
91-91.9	6	7	13
92-92.9	14	11	3
93-93.9	0	2	...
Total cities	57	57	53
Weighted avg. R.O.N.	90.9	90.9	90.1
Weighted avg. TEL, ml./gal.	2.19	2.24	2.38

Movible Offshore makes final touches and . . .

Big Barge Is Ready for Texas

PASCAGOULA, Miss. — Another giant offshore drilling barge, now nearing completion at a Pascagoula shipyard, is scheduled to start drilling off the Texas coast about mid-September.

The vessel is Movible Offshore Co.'s No. 2, built by Ingalls Shipbuilding Corp. It's designed to operate in water more than 70 ft. deep.

Movible Offshore, formerly known as Mobile Offshore Co., was organized last fall by a group of well-known Houstonians (OGJ, Nov. 5, 1956, p. 65). President of the company is Bowman Thomas, formerly of Thomas & Meadows Drilling Co., which was absorbed by the new firm. Directors include Herman Brown, president of Brown & Root, and Harold Decker, president of Highland Oil Co., who also is a vice president of the new company. W. J. Goldston, president of Goldston Oil Co., Houston, also is a vice president and director.

The new barge is similar in many respects to the "floating West Texas farms" popularized by Kerr-McGee Oil Industries, Inc. The hull measures 201 by 203 ft. Height from the base of the hull to the deck is 110 ft.

The Movible No. 2 follows the same principles as a floating dry dock. However, the solid wing walls of a floating dry dock have been replaced by vertical cylinders to reduce exposure to waves and wind.

As many as eight wells can be drilled from the barge at one location. The vessel also is designed so its cantilevered rig can be used for workover jobs at existing production platforms.

First assignment for the Movible barge will be for Shell Oil Co. off Corpus Christi.

The Movible No. 2 cost about $3,500,000. It is the company's first drilling barge, although Movible operates another offshore rig on an oil company platform.

Before forming his own company in 1955, Thomas was associated with Humble Oil & Refining Co. He had been chief petroleum engineer for Humble and in charge of the company's marine equipment division and drilling-equipment division.

Thomas also was in charge of Humble's ship construction during its early offshore operations and later was assistant manager of production.

Coal Research Blocked

WASHINGTON. — Congress has blocked immediate construction of a $3-million coal-carbonization pilot plant in Wyoming. The project was planned by Union Pacific Coal Co., subsidiary of Union Pacific Railroad and Husky Oil Co.

Officials said a delay of at least 8 months in plans to construct the test plant near Rock Springs in southwestern Wyoming resulted from congressional shelving of enabling legislation (OGJ, June 24, p. 107).

The pigeon-holed bill would permit railroads to mine coal for use other than in locomotives. It also would increase the maximum coal acreage a company could lease from 5,120 acres to as much as 20,480 acres under certain conditions. Utah coal mine operators objected to the bill on grounds it would allow railroad property to compete for their markets.

Gas Permit Signed

Medicine Hat line sought for Saskatchewan cities

EDMONTON. — Alberta Premier E. C. Manning has signed a permit allowing the export of 223 billion cubic feet of natural gas from the Medicine Hat region to Saskatchewan.

The permit authorizes Britalta Petroleums, Ltd., Calgary, and Crescent Corp., Tulsa, to sell the gas to Saskatchewan Power Corp., which plans a 250-mile line from Medicine Hat to Swift Current, Moose Jaw, and Regina. These cities also will be served by Trans-Canada Pipe Lines, Ltd., starting this month.

The companies will receive a starting price of 10 cents per M.c.f. from S.P.C. for gas from Many Island Lake field, near Medicine Hat in southeastern Alberta. S.P.C. may take not more than 83,000,000 cu. ft. on any single day and not more than 18 billion cubic feet during any 12-month period. Average deliveries are expected to be 50,000,000 cu. ft daily.

S.P.C. will apply immediately for a permit from the federal board of transport commissioners to build the pipeline. Quick approval is expected. A take-or-pay clause in the producers' contracts becomes effective next month. This applies to a volume of gas equal to half the market in Moose Jaw, Swift Current, and Regina (OGJ, April 9, 1956, p. 74).

Issuance of the permit by Premier Manning climaxed months of dispute in which the city of Medicine Hat opposed the export on grounds it would threaten the city's future supply. The permit provides a buffer zone between the export area and gas reserves owned by Mexican Hat, giving the city the protection it sought.

The city has offered the producers $10,000,000 for 100 billion cubic feet of gas over a 30-year period. This, together with reserves owned by the city, would guarantee a 40 to 50-year supply. Britalta and Crescent have not yet acted on the offer.

3 FOLD Expansion served by CB&I Structures

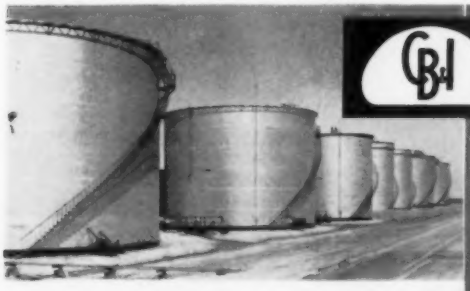
new "Cat" Cracker boosts Salt Lake Refining Company gasoline output by 20%

Included in the most recent expansion program of the Salt Lake Refining Company were CB&I-fabricated components for the new fluid catalytic cracking unit shown above.

The new "cracker", furnished through Fluor Corporation, has boosted gasoline output by 20%. The building of additional Horton® Floating Roof tanks now brings Salt Lake's storage capacity to more than 1,600,000 barrels.

Whether *you're* building new, or adding to . . . the *complete* facilities for design, fabrication and erection offered by CB&I can meet your most *specific* needs for petroleum storage or processing structures. Write for details.

P54



These Horton Double-Deck Floating Roof tanks are some of the 63 CB&I tanks located at Salt Lake Refining Company.

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After 17 years and 2,160,000 bbl. . . .

Big Mississippi Well Still Good

JACKSON, Miss.—Texas, Oklahoma, and California are famous for prolific wells. But Mississippi, a smaller oil state, has its big wells, too.

Mississippi's most remarkable well now has produced more than 2,160,000 bbl. of oil—and is still pumping 165 bbl. per day.

The prolific pumper is Union Producing Co.'s 1 Mrs. Florence Harris in Tinsley field in Yazoo County.

The well was turned into the tanks on December 23, 1940. Though nearly 17 years old, the 1 Harris still may have much of its career in the future.

It is one of six Union Producing Co. wells on the Florence Harris lease in the east segment of Tinsley. The six were drilled on 40-acre spacing. Together they had made roughly 8,000,000 bbl. of oil to May 1, 1957, and the 1 Harris accounted for more than 26 per cent of the total.

Union discovered oil September 5, 1939, at Tinsley with its 1 Woodruff in the Woodruff sand at 4,550 ft. It was Mississippi's first commercial oil producer.

The 1 Harris was completed at 4,913-50 ft. in the same zone and flowed on test at a rate of 450 bbl. daily through a 16/64-in. choke. Surprisingly, the well had to be put on the pump within a year and a half (July 7, 1941) after flowing only 24,067 bbl. because of a lack of gas and pressure in the pay.

It started out pumping over 500 bbl. a day. Today, it is still making about 165 bbl. daily along with about 560 bbl. of water.

The well still looks much the same as it did when it was a youngster. There have been no major workovers—only ordinary maintenance, such as rods and tubing replacement.

A larger pump finally was installed early last year to handle water now encroaching into the pay in increasing quantities.

Union's geologists and production engineers attribute the 1 Harris' phenomenal production to a nearly ideal location on the structure and excellent sand permeability.

Look, Ma, No Roustabouts!

NEW ORLEANS.—Shell Oil Co. has got rid of all its roustabouts in the New Orleans area without firing anybody.

Men formerly known as roustabouts have been given the new title, "maintenance men." Similarly, Shell has converted gang pushers into "maintenance leadmen." Gager pumpers, pumpers, gas lift operators, and paraffin scrapers all have been given the title, "lease operator."

The reclassification is part of Shell's program to make job titles more descriptive of the work actually performed.

Price Cut to Stick

Michigan purchasers pay 15 cents less for crude

A CRUDE-OIL PRICE cut in Michigan fields apparently is going to stick.

When lower postings of 15 cents were announced for most fields last month, there was grumbling among some producers. One of them, Carter Oil Co., resisted for a week and then gave in.

Leonard Crude Oil Co., largest purchaser of Michigan's 25,000-bbl. per day output, led the way in reducing prices with the announcement that "these price adjustments are due to accumulating resistance on the part of our refiner customers to use Michigan crude oils."

Other buyers followed suit.

John O. Campbell, manager of crude oil and gas sales for Carter, said he was looking around for other buyers but announced later that "we had to give up."

"As far as we know, everybody has met the Leonard posting," Campbell said last week. "But we're still unhappy."

Carter produces 1,200 bbl. per day.

The reduction by Leonard was 15 cents in all but a half-dozen fields, where the cut ranged from 5 to 19 cents. A few were raised to make the $2.90 per barrel minimum. Top posting is $3.10 in the Coldwater and Gilmore fields.

Some producers who opposed the cut contended there isn't as much difference in quality between Michigan crude and that of other states as the price cut would indicate.

Before the reduction, field postings in Michigan were a little higher than in neighboring Illinois. Now they are lower, although pipeline costs from Illinois fields to Michigan refineries run about 35 cents per barrel.

Antitrust Suit Dismissed

BUTTE, Mont.—U. S. Dist. Judge W. D. Murray has dismissed a suit charging seven major oil companies with violating federal antitrust laws.

The judge issued a summary judgment in favor of Continental Oil Co., The Texas Co., The California Co., Phillips Petroleum Co., Standard Oil Co., Carter Oil Co., and Union Oil

Co. of California. The firms were charged nearly 2 years ago by Clarence Ryan, Helena service station operator, with refusing to permit him to advertise and sell at a discount their nationally advertised brands of gasoline.

Judge Murray ruled that Ryan's allegations were without foundation.

Unit Change Signed

Secondary-recovery plans for Citronelle get boost

CITRONELLE, Ala.—Plans for a secondary-recovery program at Citronelle field have been given a lift by a new Alabama law governing unitization.

The statute recently was signed by Gov. James E. Folsom. It requires approval of only 75 per cent of operators and royalty owners to unitize a field. Previously 100 per cent approval was required in Alabama.

Gulf Oil Corp., one of the major operators at Citronelle, has been urging an early secondary-recovery program at the 2-year-old field (OGJ, Aug. 19, p. 93). Some of the other operators, however, are in no hurry to start.

Although Citronelle crude reserves have been estimated at 150,000,000 bbl. or more by some officials, primary production is expected to yield only about 10,000,000 bbl. It has been estimated that secondary recovery may increase the field's production by 40,000,000 bbl.

Hot Area Pays Off Again

CALGARY.—The Slave Point-Devonian has yielded its third oil discovery in the highly promising Virginia Hills-Swan Hills region of west central Alberta.

Home Oil Co., Ltd., et al brought in 11-19 Edith Lake, about 6 miles southwest of Swan Hills field, adding more zip to what is shaping up as western Canada's hottest exploratory area of the year.

On first drill-stem test at 8,180-8,208 ft., the well flowed light-gravity oil to the surface and gave a full-pipe recovery. It was too early to tell whether the well was on the same structure as nearby Swan Hills.

Excitement over the area was kicked off several months ago when 9-20 Virginia Hills became the first well in Canada to find oil in the Slave Point. Swan Hills came in soon after. A fourth Slave Point strike, Phillips Oil Co.'s Kaybob discovery, was made several miles to the west.

Processing briefs

Standard Oil Co. of California's long-announced Pacific Northwest refinery may be started late next year. The company has already bought a 2,000-acre tract at Mukilteo, a suburb of Everett on the eastern shore of Puget Sound.

Original plans, announced more than a year ago, called for capacity of 60,000 to 100,000 bbl. daily. But now there are indications the plant will have initial capacity of 60,000 bbl. and will cost an estimated $75 million.

In a cost-cutting move, Esso Standard Oil Co. is reducing its supervisory and professional staff by about 200 at the Bayway refinery, Linden, N. J. This will be done by transfers, and by early retirements affecting supervisors 55 and older. The imbalance on supervisors resulted from a layoff of 513 wage employes earlier this year at the 168,000-bbl. refinery.

The 3-month strike has ended at Pure Oil Co.'s 48,000-bbl. Lemont, Ill., refinery. Agreement between Pure and the Oil, Chemical, and Atomic Workers International Union calls for a 6 per cent pay increase retroactive to May 1. Pure dropped its suit against the union for alleged damages stemming from interruption of major construction, and the union paid a nominal sum and court costs.

Hercules Powder Co. is diversifying production at its Hercules, Calif., ammonia plant by adding synthetic-urea facilities. When completed next year, the new plant will produce 10,000 tons of urea per year. About 80 per cent will go to fertilizer and other agricultural uses, and the rest to resins and plastics.

L. Sonneborn Sons, Inc., is adding oxidized microcrystalline waxes to production at its Petrolia, Pa., wax plant. Construction of new facilities will start soon. A pilot plant is already turning out the new product, used in food packaging, in limited quantities.

A specially-designed barge to haul refined lube oil and dry cargo is being built by Sinclair Refining Co. The barge will shuttle between Sinclair's Houston refinery and a new compounding plant at Birmingham, Ala.—a 1,000-mile trip.

The 240-by-48-ft. vessel will carry 19,000 bbl. of products in 12 tanks. A 200-by-36-ft. deckhouse will carry up to 700 tons of packaged products. The barge will be pulled by towboat.

Goodrich-Gulf Chemicals, Inc., does not have a polyethylene plant under construction at Orange, Tex. Such a project was erroneously listed in the Journal's annual petrochemical survey (Sept. 2, p. 128).

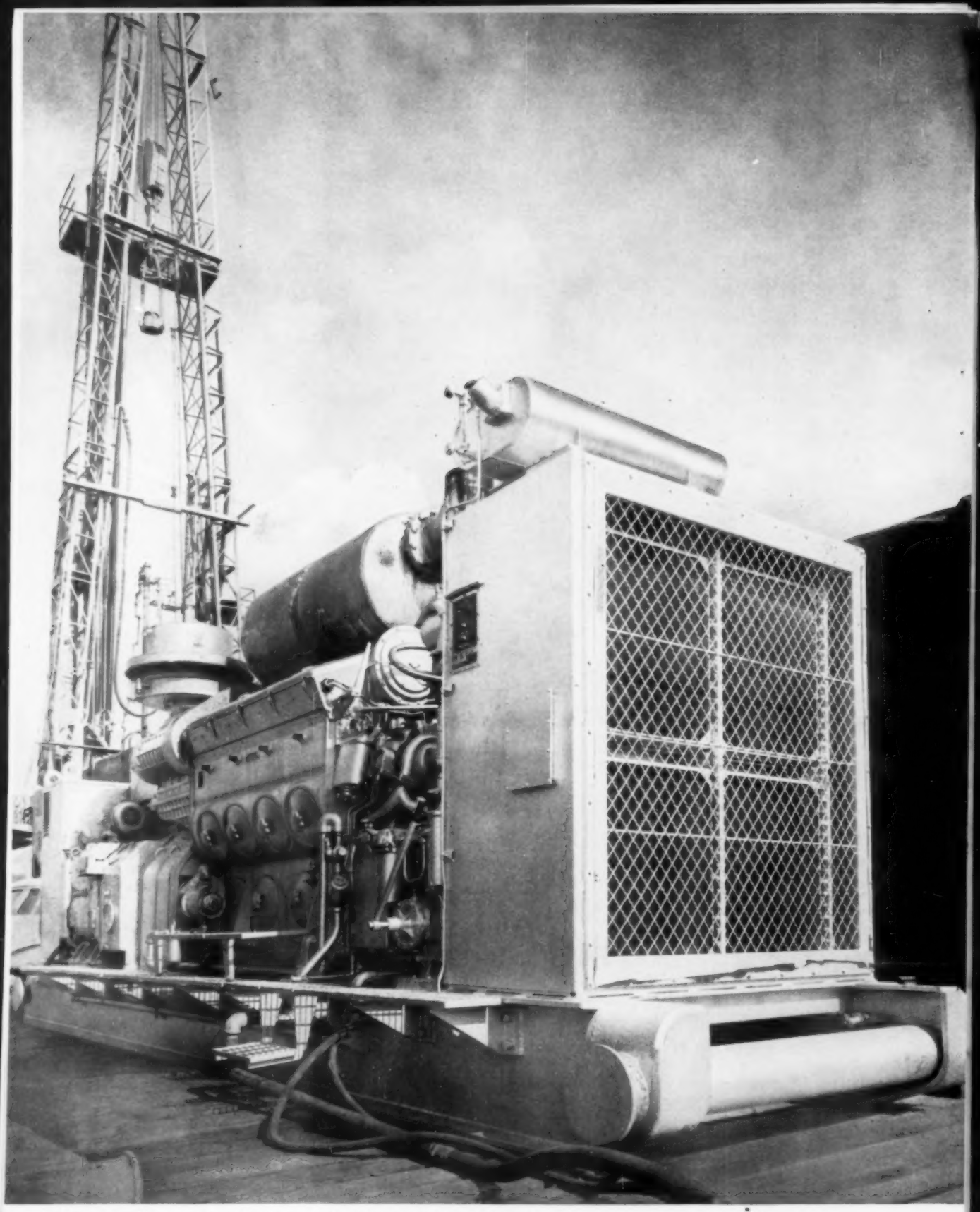
Mississippi Chemical Corp. will build a 150-ton per day nitric acid plant at its Yazoo City, Miss., ammonia plant. Completion is scheduled for early 1958. Chemical & Industrial Corp. has the contract for design and construction. This company is also engineering a 250-ton nitric acid unit at the Atlas, Mo., ammonia plant of the Atlas Powder Co. The Atlas unit will have a waste-heat boiler that recovers heat from the converter product gases to generate 18,000 lb. per hour of 200-psi. steam. The steam runs a steam turbine which in turn drives a centrifugal compressor supplying the air to the catalytic converter in which ammonia is oxidized to nitric acid.

General Petroleum Corp. expects to complete work this fall on a new 12,000-bbl. catalytic reformer at the company's Torrance, Calif., refinery.

Also for Refiners . . .

A revolution in aircraft fuel demands is near with coming of jet age (p. 51) . . . Talks will open soon for merger of International Chemical Workers and O.C.A.W. (p. 57) . . . Summer slump lowers octanes—premium to 98.1 and regular to 90.9 (p. 61) . . . Leonard's 15-cent price cut on Michigan crude apparently is sticking (p 64) . . . Hydrocarbon Research has a new technique for deep hydrogenation of heavy petroleum residuals (p. 71) . . . West German refiners expect heavy gains in fuel-oil output to feature their operating gains next year (p. 80).

PLUS THESE TECHNICAL FEATURES: How Vickers used the "package" concept to cut refinery-expansion costs (p. 97) . . . Phillips' field plant at Andrews processes gas from 14 Texas pools (p. 100) . . . Bauxite Treaters save money for D-X Sunray (p. 103) . . . The Foreman's Page (p. 119) . . . and Questions on Technology (p. 123).



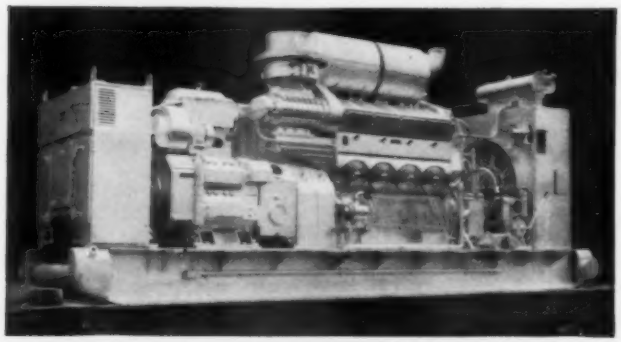
In operation on Sun Oil Company's Rig 15 at Rayne, La. is Electro-Motive's new drilling power unit, the SR-10. Main features include increased engine hp, increased generator and drive motor capacity, lighter weight, integral AC generator, simplified maintenance and load regulator control.

Announcing
a significant advancement in
deep well drilling power

New Electro-Motive SR-10 Power Unit

In 1955, Electro-Motive introduced the first fully integrated Diesel-electric power system for oilwell drilling. Success of these units is demonstrated by the fact that Electro-Motive Power is widely used by drilling companies throughout the Gulf Coast area.

Now, Electro-Motive offers another first and significant contribution to the oil industry's increasing need to drill deeper, faster and more economically — the first standardized, completely self-sufficient Diesel-electric power system. These are its features:



The SR-10 is a refinement of Electro-Motive's original plan to build a *complete* and integrated Diesel-electric system designed and built to work as a unit with one manufacturing responsibility.

For detailed specifications on the new SR-10 unit, contact your Electro-Motive representative in any of the cities listed below.

INDEPENDENT AC SUPPLY

A new integral AC generator (100-KW) makes the SR-10 completely independent of outside supply for its own AC needs—blowers, exciters, control equipment.

INCREASED POWER

Engine horsepower has been increased to 1000. New D49-G generators produce up to 640-KW each (2 per engine). New D49-M drive motors deliver up to 800 horsepower.

GREATER POWER UTILIZATION

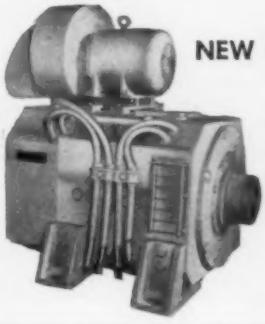
New load regulator provides load balance between units. Thus, if power requirements exceed that available on one unit, the load regulator automatically loads a second unit to satisfy drilling demands.

REDUCED MAINTENANCE

New improved motor control cabinet is simpler and more efficient. Its new design combines with many other improvements, both electrical and mechanical, to appreciably reduce overall maintenance time and expense.

LIGHTER WEIGHT

A new speed-increasing transmission between the engine and generators and other changes have cut the weight of the air cooled unit by more than 2000 pounds.



NEW D49-M DRIVE MOTOR

Improvements in design and materials of both the new motor and generator have appreciably increased horsepower and provided for beiter moisture protection. Motors and generators are identical except for field windings, a factor that facilitates service and reduces costs.

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Crude Line Gets 30-In. Loops

VANCOUVER — Trans Mountain Oil Pipe Line Co. is completing an expansion program which will raise capacity of its crude system from 200,000 to 240,000 bbl. per day.

Two 50-mile, 30-in. loops, laid by Dutton-Williams Brothers, Ltd., and R. A. Conyes Construction Co., are being tested. The loops are located west of Edson, Alta., and east of Kamloops, B. C., on the 720-mile, 24-in. system from Edmonton to the Puget Sound area of Washington.

Trans Mountain has built two permanent pump stations at Gainsford and Jasper. The Gainsford station has four 1,500-hp. electric-driven units and Jasper has four 1,500-hp. diesel-driven units. The Sumas, Wash., pump station, with three 1,500-hp. electric units, will be completed by the end of the month.

A tank farm is being constructed at Sumas to permit more flexible operations and maintain full main-line capacity through the 20-in. spur line to Washington refineries. The tank farm is located at the junction of the main 24-in. Canadian line and the Washington spur.

Temporary pump stations at Niton, Alta., and Albreda and Kingsvale, B. C., will be ready for operation shortly.

Further expansion planned . . . The loops and new stations are the first step in a long-range expansion program which is already ahead of schedule. Designed for ultimate capacity of 300,000 bbl. daily, the Trans Mountain system will exceed this figure when the 30-in. looping has been extended along the entire route of the line.

Plans now call for an ultimate double line with pumping capacity concentrated in larger stations rather than several smaller stations on the original 24-in. line.

Expansion will be geared to increased demand for Alberta crude from Washington and British Columbia refineries and shippers from the Vancouver offshore terminal. A new oil-loading dock to handle 60,000-ton supertankers will be started this fall at Vancouver. It will be completed by April 1958.

Gulf Adding Penex Unit

PORT ARTHUR.—Contract has been let for the first isomerization unit to make isopentane from normal pentane. Procon, Inc., will build the 10,000-bbl. unit at Gulf Oil Corp.'s 300,000-bbl. Port Arthur refinery.

The pentane isomerization unit will use the Penex process, developed jointly by Gulf and Universal Oil Products Co. It will make three main products: isopentane for direct blending to aviation and motor fuels; hexanes, which will serve as raw stock for petrochemical manufacture; and a dehexanized product which Gulf will feed a 26,000-bbl. Platforming unit now under construction.

The isomerization unit will include two towers about 12 stories high and 17 ft. in diameter. These columns, together with three smaller ones, will separate normal pentane, isopentane, and hexanes from straightrun naphtha. A new cooling tower and circulating water system will also be built. The project is scheduled for completion in about 15 months.

Gulf Cases Linked

Justice Department will amend tidelands complaint

WASHINGTON.—An amended complaint bringing all of the Gulf Coast states into the Louisiana tidelands case will be filed with the U. S. Supreme Court shortly by the Justice Department.

The new complaint was made necessary when three of the four gulf states invited last June to take part in the case either did not respond or declined the invitation.

The Louisiana suit, in which the Government contests the state's right to its claimed 3-league boundary, will be heard by the court during its next term which opens in October.

The court, apparently tiring of the Government's piecemeal efforts to settle the boundaries of the coastal states, wrapped the gulf situation into a single package before it ended its last term in June.

An order was handed down giving the other gulf states 60 days in which to join in the case. The Justice Department was directed to file an amended complaint adding as parties, in addition to Louisiana, any states that did not join within that time.

Only Alabama accepted the offer. Mississippi refused to join and Florida and Texas did not even reply.

The Justice Department contends that a state cannot have a seaward boundary beyond that of the United States—3 miles. But Texas, Florida, Mississippi, and Louisiana contend they came into the Union under circumstances which constitute exceptions to the rule.

Texas joined the Union as an independent foreign nation whose 3-league boundary already had been recognized. Florida was given up by Spain under a treaty in 1819. Louisiana was bought from France in 1803. Mississippi was taken over from Spain in 1799. The four states claim that they still hold the 3-league boundaries they had when they came under the U. S. flag.

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SAFER BECAUSE the design of the seal virtually eliminates critical vapor space—prevents collection of explosive air-vapor mixture, even in the broad range of jet fuels.

SAFER BECAUSE even in exposure fires if fabric is damaged, there is an all-steel, fire-retardant seal. In exposure fires, all-fabric seals burn out quickly, leaving no seal at all.

SAFER BECAUSE the fabric is protected by the Weather Hood against sun and the collection of rust and ice. Fabric never comes in contact with the tank shell and can be inspected easily at any time.

SAFER BECAUSE the floating roof is "grounded" to the tank by an electrical path which never passes through a confined air-vapor volume.

SAFER BECAUSE if boiling liquid due to external fire forces vapor up through shoe-shell slot, ignited vapor is confined to a small sector. If unburned liquid is forced up, the Weather Hood prevents it from falling back onto the fabric.

SAFER BECAUSE the possibility of fire originating within the seal is reduced almost to zero. Even when the air-vapor mixture is test-ignited, pressure during burning is held to atmospheric. Fabric *instantly* flexes upward—expanding 300% to 500%—containing the products of combustion without damage to the fabric.

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WIGGINS SAFETY SEAL

H-Oil Process Ready

• Hydrocarbon Research tackles temperature control with new method for hydrogenation of heavy oil fractions

A NEW TECHNIQUE for deep hydrogenation of heavy petroleum residuals is making its debut. Hydrocarbon Research, Inc., has taken the wraps off the "H-Oil" process.

After 5 years of research, H-Oil is ready for commercial application. It can be used on a wide variety of stocks, ranging from light distillates to such difficult feeds as furfural extract, heavy cut cycle stock, or vacuum tar.

The process uses a standard commercial desulfurization catalyst. For severe hydrogenation requiring high hydrogen volumes, it will be teamed with the synthesis gas process licensed by Texaco Development Corp. and H.R.I.

The company made economic studies of two theoretical units, both charging heavy residuals. One was a 5,000-bbl. unit costing $4,200,000 and operating on excess hydrogen from cat reforming. The other was a 14,000-bbl. unit costing $11,200,000 and including hydrogen manufacturing facilities for its entire hydrogen requirement. Both units included products recovery and monoethanolamine off-gas purification.

A payout of about 17 months was indicated in both cases.

Temperature control . . . H.R.I. claims one big advantage over other processes introduced over the past 2½ years. H-Oil has been successful in controlling the temperature in the catalyst bed to within 20° F.

This gives two desired results: It all but eliminates carbon laydown at high temperatures, obviating the need for frequent regeneration of catalyst. And it makes full use of all catalyst in the reactor by controlling its temperature to the optimum required for each particular feed stock.

Temperature control was recognized as the big problem when H.R.I. first tackled hydrogenation more than 5 years ago. As an example, in deep hydrogenation, combining 1,500 cu. ft. of hydrogen with each barrel of feed stock, about 90 B.t.u. are given off for every cubic foot of hydrogen absorbed.

This would mean that for every barrel of feed processed, 140,000 B.t.u. would be given off in the catalyst bed. This would raise the reactor temperature 450° to 500° F. without some means of heat removal.

Pilot-plant runs on an 8°-gravity Kuwait residuum show that catalyst activity after 1,170 hours is only slightly under activity after 370 hours.

H.R.I. isn't saying just how it has succeeded in removing all this heat of reaction. But the specially designed reactor has been shown to two major oil companies which are interested in some future uses of the process.

Where to use it . . . Just when the H-Oil process will see commercial use revolves around a number of economic factors. In areas where a good market for coke exists, it probably won't prove competitive for the present. The spread in prices of residual and distillate fuels is a major factor. The relatively strong heavy-fuel market along the East Coast would not favor this process or any hydrogenation process now.

The H-Oil process can be applied to any degree of hydrogen treating or hydrogenation, but H.R.I. expects it to find its place in the more severe type of operation.

H.R.I. investigated possible application in desulfurizing a whole crude in the field. Runs on a 28.7°-gravity crude with 2.26 per cent sulfur resulted in reducing sulfur to 0.4-0.6 per cent, raising gravity to 34°-35°.

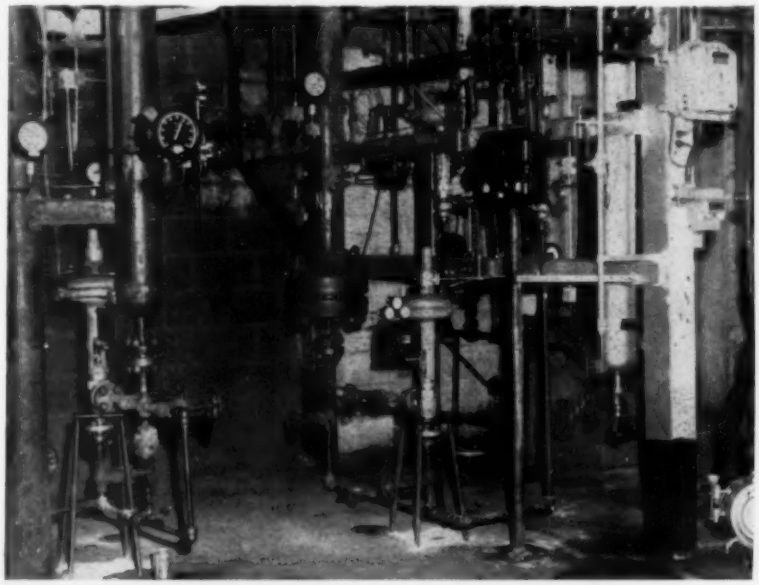
This was done with a hydrogen requirement of 370-440 cu. ft. per barrel of feed stock. In this particular case, the differential in price commanded by the sour and processed crude did not justify use of hydrodesulfurization, including hydrogen manufacture.

The new process may first prove practical in handling some of the more difficult stocks. H.R.I. has found that vacuum tars require less severe treatment than heavy cycle stock from catalytic cracking, and furfural extracts. Top hydrogen requirements of 2,200 cu. ft. per barrel were marked up in processing a heavy stock which had been cycled twice through a catalytic cracker. Desulfurization, saturation, and hydrocracking accounted for the high hydrogen requirement, but the feed was successfully treated to make good catalytic cracking feed.

H.R.I. believes that the first application of its process may well be the treating of some "problem" stock at an interior refinery where the coke market is not attractive.

For this type of operation, H.R.I. suggests a modification involving two reactor stages. The heavy gas-oil fraction produced in processing a heavy residuum can be advantageously recycled to a second reactor under slightly different operating conditions to yield high-grade middle distillates.

At the same time, distress stocks such as furfural extract or heavy cat cycle stocks could also be charged to the second reactor.



A NEW HYDROGENATION PROCESS was developed in this 25-bbl. pilot plant at the Hydrocarbon Research, Inc., lab in Trenton, N. J. At left is the bottom of the high-pressure product separator. The base of the scrubbing tower is shown in the center. At right is part of the hydrogen recycle compressor.

Pipe is bent and welded on shore . . .

. . . then towed into the proper position.

Ends of line are tied in on shore . . .

. . . and a driver frees cables from pipe.

Pipeline Makes Fast Trip Across Canal

NEW ORLEANS.—By prefabricating an underwater pipeline Southern Natural Gas Co. recently installed a 20-in. line across the Intra-Coastal Canal with near-minimum interference to ship traffic.

Brown & Root, Inc., contractors on the job, bent and welded the pipe on shore, then floated it across the waterway for a fast tiein. The crossing required about 4 hours. The line was bent into a broad "U" shape to conform with the bottom and sides of the canal. While floating across the channel the "U" was kept in a horizontal position, its upper ends hinged in "Flexifloat" barges. When the assembly reached its proper location, barges in the middle of the channel allowed the pipe to swing slowly into place for burial. The 569-ft. crossing is Southern Natural's second near Chalmette, La. After the new crossing was completed and tied in with the existing pipeline on shore, the old submerged line was buried deeper.

The dual crossing prepares Southern Natural for the anticipated increase in flow of gas from coastal fields near the mouth of the Mississippi River.

Last month, the Federal Power Commission approved Southern Natural's proposed $7½-million expansion program in southern Louisiana. The company plans to build additional pipeline facilities to tap additional reserves in Plaquemines, St. Bernard, and Jefferson parishes.

Depletion Fight Set

- Industry faces effort to reduce rate; Treasury may have to take stand

WASHINGTON.—The oil and gas industry's depletion allowance will face immediate attack in both the House and Senate when the 1958 Congress opens January 7.

Here's the lineup:

...**The House** ways and means committee will study the 27½ per cent rate to decide whether it should be cut.

...**The Senate** finance committee will be asked to back a bill to restrict depletion to U. S. oil alone.

Either one or both these changes could well be written into the new tax law which Congress will pass.

The industry's rate has become an issue every time the House group has dealt with taxes over the past decade or more. But for many years action has been stymied by the Treasury Department's refusal to say what it thought the rate should be. The department always has reported the question still "under study."

Next year the committee plans to force the Treasury into the open.

Former Secretary George Humphrey went on record last year as supporting the idea of depletion. He was silent about the rate. But he said the allowance has served its purpose as an incentive to intense search for new oil reserves.

Robert B. Anderson, who succeeded Humphrey as secretary a few weeks ago, told the Senate finance committee in June he would approach the depletion question "objectively." But he pointed out that in the past he backed the present allowance.

Foreign issue raised . . . The attack on depletion for foreign production will be led by Sens. Joseph C. O'Mahoney of Wyoming and John B. Carroll of Colorado. They put their ideas into a bill offered only a few hours before Congress adjourned August 30.

At the time the allowance first was adopted, its sole purpose, according to O'Mahoney, was to encourage exploration and development in this country. He says its extension to foreign oil has worked to the great disadvantage of domestic producers.

The matter was discussed at length in O'Mahoney's recent report on last winter's oil investigation. He charged that, had it not been for depletion, the Treasury would have gained some $60 million more from Arabian American Oil Co. last year.

Pipeline briefs

El Paso Natural Gas Co. has let a contract to R. H. Fulton & Co. for a gathering system to pick up gas from its own leases in Gray, Wheeler, and Collingsworth counties in the Texas Panhandle. Fulton will start immediately on the gathering lines, which range up to 20-in. in diameter. The system will expand with development.

Fulton is already under way on El Paso's 94-mile, 18 and 20-in. line from near Shamrock, Tex., to its system at Dumas, Tex. An 8,100-hp. compressor station is being built 17½ miles west of Shamrock in Gray County by C. F. Braun, Los Angeles. El Paso recently acquired 178,000 acres in this area and plans to drill some 500 wells to develop the property (OGJ, June 17, p. 100).

Pacific Petroleums, Ltd., has completed gathering lines in Pouce Coupe, South Pouce Coupe, Fort St. John, Southeast Fort St. John, and Buck Creek fields in the Peace River area. Pacific will supply gas from these fields to the affiliated Westcoast Transmission Co., Ltd., which has just completed its 650-mile, 30-in. line to the British Columbia-Washington border. Dutton-Williams Brothers, Ltd., was the contractor on the gathering system.

Westcoast Transmission Co., Ltd.'s merger with a sister company, Peace River Natural Gas Co., Ltd., has become official. Peace River stockholders approved the deal in a special meeting. Westcoast becomes an integrated company with land holdings and natural-gas reserves in addition to its pipeline system. The merger, through an exchange of one share of Westcoast for three of Peace River, also made Pacific Petroleums, Peace River's parent company, the largest stockholder in Westcoast.

Service Pipe Line Co. will increase the capacity of its trunk line serving Chicago and Michigan refiners with three new pump stations now being built. Service is installing a 2,000-hp. electric-driven centrifugal unit at Medill, Mo., and 2,500-hp. units at Ormonde, Ill., and Streator, Ill., stations. The new stations will raise average winter capacity between Freeman, Mo., and LaPlata, Mo., by 29,000 bbl. per day to 289,000 bbl. per day. Capacity between LaPlata and Manhattan, Ill., will go up 40,000 to 233,000 bbl. per day. The stations will be linked by a new microwave system.

Service will transport crude for Muskegon Pipe Line Corp.'s 165-mile, 10-in. line from Griffith, Ind., to Muskegon, Mich., with capacity of 26,000 bbl. per day. Service and Aurora Gasoline Co. own the line.

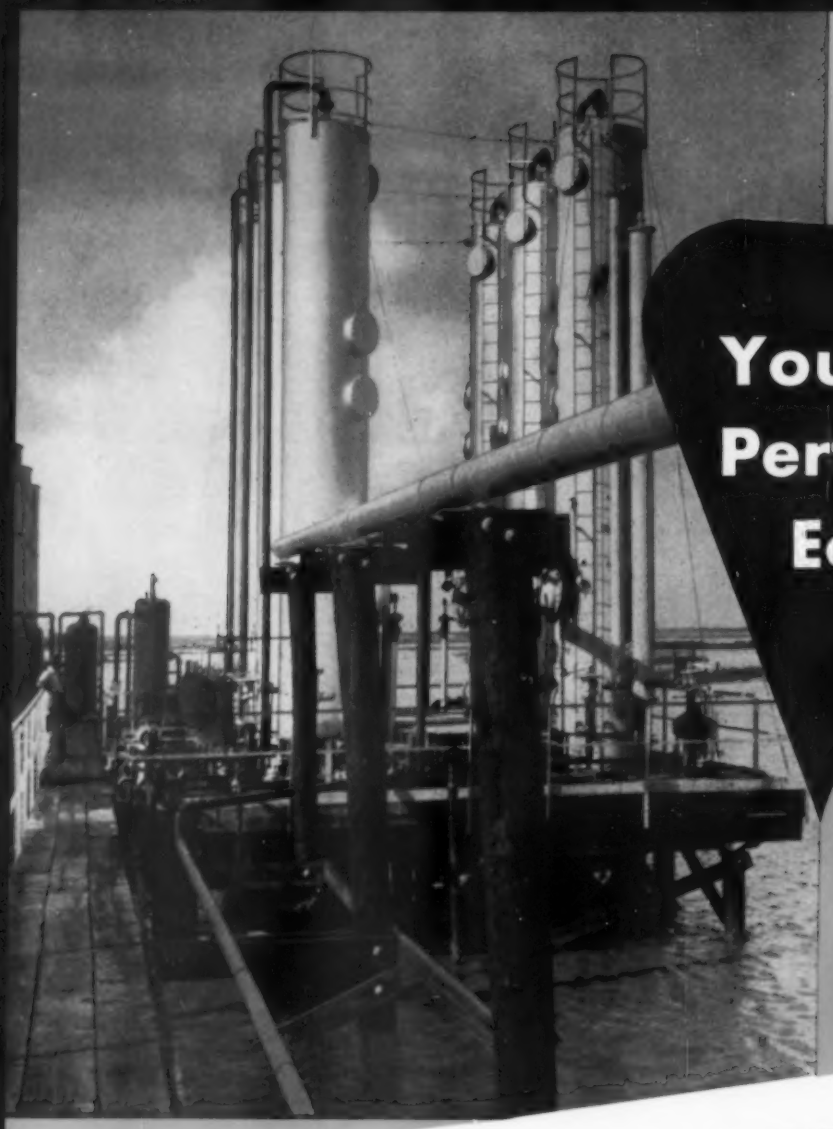
Midwestern Constructors, Inc., started work on the Muskegon line August 10 at Muskegon. A second Midwestern spread will start work on the southern end this week. Progress has been slowed near Muskegon by swamp, where 10,000 ft. of pipe was laid by the "push ditch" method. The project is to be completed late this year.

Rangeland Pipe Line Co., Ltd., subsidiary of Hudson's Bay Oil & Gas Co., Ltd., is operating its new crude gathering system and trunk line in west-central Alberta. The 47½-mile trunk line extends from Gilbey to Sundre. The $2,300,000 project permits movement of crude either south to Calgary through the Cremona system or north to the Trans Mountain and Interprovincial lines at Edmonton. Initial throughput of 3,300 bbl. daily is expected to climb to 10,000 bbl. daily.

Also for Pipeliners . . .

Louisiana orders ratable take of oil from a field for the first time (p. 56) . . . A prolific gasser which blew out near Port Arthur, Tex., has been completed on an emergency basis and turned into pipeline (p. 60) . . . Texas producers step up fight against pipeline proration (p. 61) . . . Alberta premier has signed gas-export permit for Alberta gas to go to Saskatchewan (p. 62) . . . Trans Mountain is completing a 30-in. looping program (p. 68) . . . Prefabricating helps Southern Natural install 20-in. line across canal in record time (p. 72) . . . Iranian and Turkish governments have reached preliminary agreement on 38-in. crude line from Qum field to the Mediterranean port of Iskenderun, Turkey (p. 76) . . . Russians use asbestos-cement pipe to whip corrosion from sour gas (p. 79).

PLUS THESE TECHNICAL FEATURES: Texas Gas microfilms records for economical filing (p. 135).



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However, because of the limited space available for platform mounting... and because they are in close proximity to a battery of storage tanks mounted on the same platform... these treaters are heated by steam from a remotely located BS&B Steam Generator. Thus, a considerable saving is made on pipe connection work as well as on expensive platform space.

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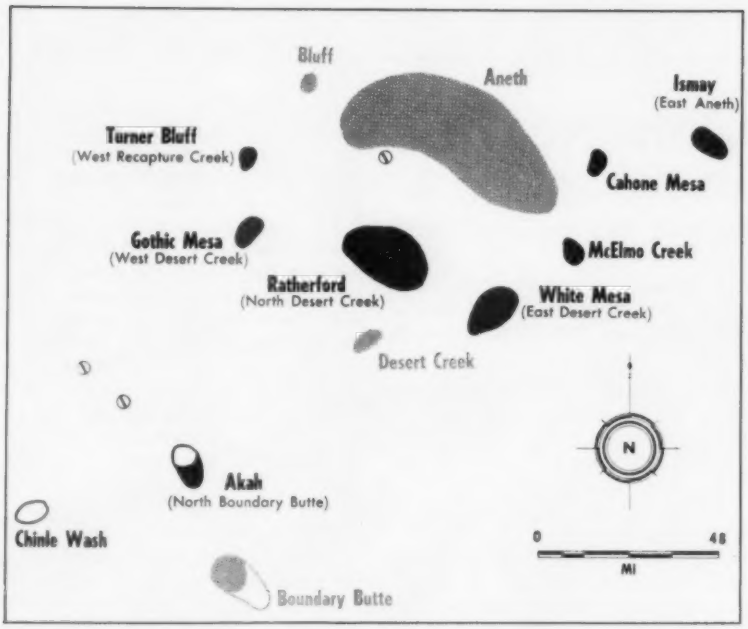


FIELDS WITH NEW NAMES are shown in bold type. Some had old names, which are in parenthesis. Aneth and three other fields retain their names.

Paradox Basin Fields Get New Names

THERE'S GOING to be just one of a kind when it comes to names of fields in Utah's section of the Paradox basin. For example:

West, North, and East Desert Creek fields are out. In their places will be Gothic Mesa, Ratherford, and White Mesa fields in that order. Likewise, North Boundary Butte field becomes Akah field. East Aneth becomes Ismay, and West Recapture Creek becomes Turner Bluff.

Other new names appearing in the basin are McElmo Creek, Cahone Mesa, and Chinle Wash. These three fields were not previously named. The "basic" fields, from which other fields derived their names, will remain the same. These are Boundary Butte, Desert Creek, Aneth, and Bluff.

Official adoption of these names has been recommended by the Utah field names advisory committee. The list becomes final this week.

Salvaged Barges to Drill Again

NEW ORLEANS.—Two of the ill-fated offshore barges which toppled into the Gulf of Mexico this year will be repaired and sent back to the treacherous water for more work.

The "Mister K," which took nine lives when it capsized in April near the South Pass of the Mississippi River, was sold to A. Marx & Sons. This company plans to rebuild the vessel. It was originally built by Golden Meadow Well Service Co. for $1,250,000.

Still overturned, the "Mister K" was floated to New Orleans after two tugs had freed it from the gulf bottom. The living quarters and helicopter landing deck, which broke loose from the wrecked vessel, remained on the gulf floor.

Plans also call for the salvage of about 17,000 ft. of drill pipe, casing, derrick, and other equipment scattered underwater near the scene of the accident.

Deepwater 2 . . . The other ill-fated barge, the Deepwater No. 2, was being towed back to port for repairs last week. It will be reconditioned at Vicksburg, Miss., by Deepwater Exploration Co., original owner.

This $1,850,000 mobile platform collapsed in the Bay Marchand area off Louisiana last month when one leg of its three legs suddenly gave way (OGJ, Aug. 26, p. 68).

The barges undergoing repairs are two of four offshore drilling vessels to plunge into the Gulf of Mexico within the past 6 months. Similar fates were met by C. G. Glasscock Drilling Co.'s "Mr. Gus" and John W. Mecom's "Ed Malloy."

—— *Industry* briefs

Douglas Oil Co.'s acquisition of Apex Petroleum Corp., Ltd., gives it approximately one-third interest in 66 wells producing 2,200 bbl. of oil daily from West Wilmington field in California. Equal partners in the wells are Morton & Dolley and F. E. Fairchild. The group is planning an intensive development program in the field, where they already have one new well drilling and two others staked. About 25 sites are left for the partnership to drill.

Crescent Corp. of Tulsa is buying 278,500 net acres of mineral interests. The $3-million deal includes 400 bbl. daily of oil production from 5,000 net producing acres of working interest in production. Some 80 per cent of the payment will be spread over 5 years. Most of the property is in Arkansas, Illinois, Kansas, Nebraska, Oklahoma, South Dakota, and Utah. The rest is scattered throughout most of the producing states.

The Texas Board of Insurance is planning a hearing in October to consider adjustments in compensation insurance rates for offshore drilling.

One item on the agenda is the possible fixing of lower rates for work in "protected waters." The board also will tackle the general problem of more accurately fixing over-all offshore rates. Offshore rates now carry a 75 per cent "loading factor" above those for onshore drilling. But this is termed a shot in the dark.

Vulcan Oils, Ltd., Calgary, has purchased all assets of Newclare Oils, Ltd., and certain Canadian oil and gas properties of Siscoe Mines, Ltd., and New Davies Petroleums, Ltd. The consolidated company will be called Siscalta Oils, Ltd., and will have authorized capital of 5,000,000 shares of $2 par value. Shares are exchangeable at two Vulcan for one Siscalta.

Tekoil Corp. of Dallas is adding an estimated 1 million barrels of oil to its reserves with the purchase of Mountain Valley Oil Co. of Denver. The purchase, which includes interest in 55 producing wells, will be Tekoil's third sizable acquisition of producing properties this summer. Mountain Valley stockholders have approved the deal, which involves stock transfer and long-term payments.

The acreage is in Oklahoma, Nebraska, Colorado, Wyoming, and Utah. Tekoil also picks up one-quarter interest in 3,000 undeveloped acres in Weld County, Colorado.

Sahara Lures Americans

Cities Service is making deal with French firms for oil play in desert; Conorado and others also are interested

TWO AMERICAN oil companies have removed the secrecy from their interest in acquiring acreage in French Algeria's Sahara Desert.

Cities Service Co. revealed it has taken a definite step toward entering Algeria. It is the first American company to make the move.

Conorado Petroleum Co., owned by Continental Oil Co., Amerada Petroleum Corp., and Ohio Oil Co., admitted it was interested in Algerian acreage. But company officials denied published reports that they have made an agreement with the French.

"We're still interested and in the running," a Conorado spokesman said.

Interest of the two American firms was revealed as the French Government extended its deadline for applications in Algeria another 2 weeks. When the French first threw open the Algerian acreage, they said it must be applied for before September 10. Last week the deadline was pushed back to September 23.

At least another dozen American companies are known to be interested in the 23,000 sq. miles of territory which two French companies are releasing—or in other acreage which other companies will release within a few months. All have tried to keep their interest hidden.

Partners picked . . . Cities Service has gone farther in its dealings with the French than others.

Last week George H. Hill, Jr., Cities Service vice president of exploration, headed back to the United States after making a deal with two French companies to look for Saharan oil.

A new company actually has not been set up yet. But Cities Service will hold a 50 per cent interest in the venture along with Ste. de Prospection et Exploration Petrolieres en Alsace (P.R.E.P.A.) and a brand new French firm, Cie. Franco-Africaine de Recherches Petrolieres (Franca-Rep). P.R.E.P.A. will hold the majority French interest.

Franca-Rep is a private company controlled by Rothschild Freres and Worms et Cie., French banking houses. P.R.E.P.A. is a government-private company. The government agency, Bureau de Recherches de Petrole, holds 65 per cent of the company. The remaining 35 per cent is held by private investment groups in France.

The first jump . . . Both Hill and Cities Service officials in the United States emphasized that the company has not yet made a final deal for Saharan acreage.

That will have to come late in October.

But Cities Service has made the first jump. It has taken on French partners for a Saharan venture. This is what the French want most of all. Cities Service will undoubtedly be granted the acreage for which it applies.

The French originally gave companies the 30 days between August 10 and September 10 to apply for the roughly 23,000 sq. miles which Cie. Francaise des Petroles (Algerie) and Ste. Nationale de Recherche et d'Exploitation des Petroles en Algerie (SN Repal) are surrendering.

The two companies have until October 25 to decide which half of the territory they now hold under 5-year exploration licenses they want to retain. They decided last month, and the released acreage was opened for concessions by the French (OGJ, Aug. 19, p. 113).

A large part of the released acreage lies to the west, north, and northwest of the most promising oil find in the Sahara, 1 Hassi Messaoud, discovered by SN Repal and being jointly developed by the two companies.

Cities Service is reportedly the type of American oil company the French would like to see enter Algeria. It is not one of the major international companies. The French frankly are welcoming smaller companies and independents. Entry of these companies would reduce any criticism the French administration might face from left-wing elements in parliament.

Iran, Turkey make deal for . . .

. . . Qum to Mediterranean Line

THE TURKISH and Iranian governments took a hand in plans for new big Middle East pipeline systems last week with a preliminary agreement for a new crude line linking central Iran and the Turkish Mediterranean coast.

An Iranian delegation is due in Ankara before the end of September with the final draft of the agreement for both governments to sign. It calls for a 38-in., 1,000-mile pipeline from Qum to Iskenderun. Iran is slated to build the line.

Just what effect the agreement will have on plans for a privately built line of about the same size and in the same general area is still a question. Seventeen oil companies, 14 of them Americans, have been discussing plans for a superinch pipeline system to move another million barrels of Middle East oil daily (OGJ, May 21, p. 106).

Neither Turkey nor any of the Middle East producing countries has been officially approached by the companies with regard to the pipeline plans. This led last week to some speculation that the Turkish-Iranian move may be an effort of the two countries to improve their bargaining position before they are approached.

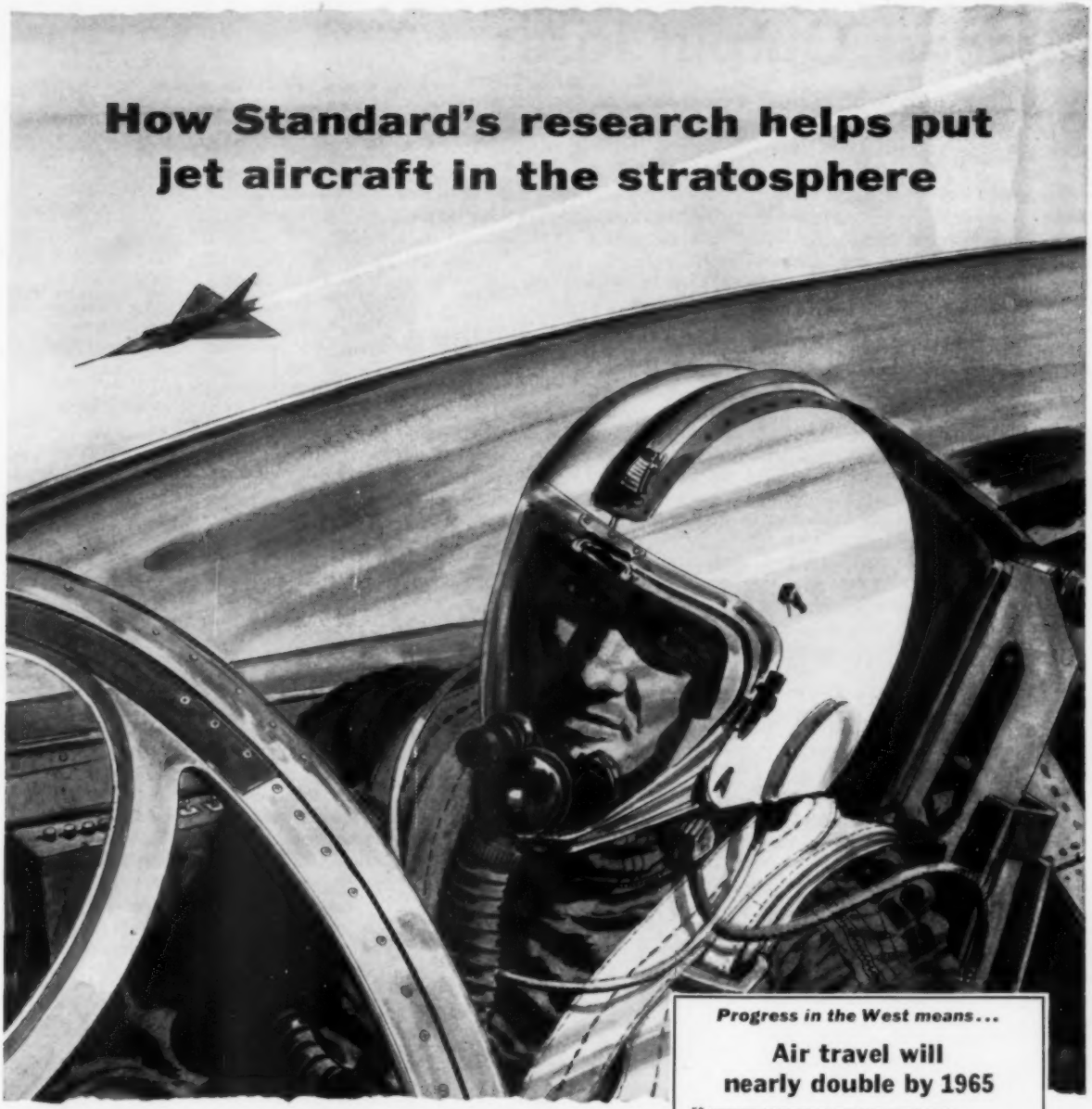
As disclosed in Ankara, the government pipeline plan would link the Qum region, where the Iranian government company made its spectacular Alborz discovery a year ago, and the eastern Mediterranean. It would cost an estimated $500 million.

If Iran does build the line, she will first have to develop Alborz field. Alborz 5 blew out and covered the countryside with more than 80,000 bbl. daily for more than 3 months. The well was never fully controlled and finally bridged and shut itself in. Iran plans to develop the field, but has not yet completed another well.

Iran also will have to locate markets for the crude if the line is built. These markets are few if you exclude the oil companies who have their own plans for a new Middle East pipeline.

Reports from Ankara last week said the initial throughput of the line would be between 140,000 and 190,000 bbl. daily. This throughput figure certainly would not call for 38-in. pipe. The private companies expect to move from 850,000 to 1,000,000 bbl. daily through a line of the same size.

How Standard's research helps put jet aircraft in the stratosphere



Standard's new synthetic oils help conquer withering jet heat and stratospheric cold.

TEN MILES UP WHERE THE JETS FLY there's a world few men know. Temperatures from 70 to 100 below zero make ordinary lubricants thick and sluggish on controls that must respond instantly. But within jet engines, moving parts must be protected against withering heat up to 600° Fahrenheit.

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Mideast Output Rises

Kuwait, Saudi Arabia push world total to record of nearly 16 million barrels in June as U.S. output dropped sharply

RECORD MIDDLE EAST output pushed free-world crude production to an all-time high of 15,964,200 bbl. daily in June, despite the sharpest drop in the United States since the country-wide refinery strike 5 years ago.

The Persian Gulf region averaged 3,957,500 bbl. daily, up 401,400 bbl. daily, or 11.3 per cent over May. The new high beat the previous record by 84,000 bbl. daily. It came 8 months after the drastic cutback following the close of the Suez Canal and the Iraq-Mediterranean pipelines.

This brought free-world output outside the U. S. to its second high in a row, up 449,500 bbl. daily to 8.857,-200 bbl. daily. The U. S. declined 335,000 bbl. daily to 7,107,000 bbl. daily.

Domestic producers knew the drop was coming. But they still had to live with the sharpest downward adjustment since May 1952. At that time wells were cut back 1,322,600 bbl. daily to 5,106,800 bbl. daily due to the refinery walkout.

Middle East . . . Kuwait accounted for 62 per cent of the Middle East gain. Its output rose 249,000 bbl. daily, or 22.2 per cent, to a record 1,370,000 bbl. daily. Saudi Arabia's 1,164,300 bbl. daily also was a new high, up 65,000 bbl. daily, or 5.9 per cent.

Among the smaller producers in the area, Qatar gained 20,800 bbl. daily for a record 145,800 bbl. daily. Steadily rsing output in the Neutral Zone was at 75,000 bbl. daily.

Venezuela gains . . . Companies operating in Venezuela added another 31,600 bbl. daily for a high of 2,968,-600 bbl. daily. This was the eleventh high in 12 months.

The June peak raised Venezuela's 6-month average to 2,899,100 bbl. daily, up 536,200 bbl. daily, or 22.7 per cent over the first half last year.

Reds supply grows . . . The Russian Government disclosed that 46.2 million metric tons of oil were produced the first half of the year. This amounts to about 1,860,000 bbl. daily, or 16.4 per cent more than the level claimed for the first half of last year.

In order to achieve its goal of 97 million tons for 1957, Soviet fields would have to average 2,020,000 bbl. daily the last 6 months.

Soviet natural-gas production was placed at 9 billion cubic meters the first half, or 1.75 billion cubic feet daily, up 40.7 per cent over the 6-month output a year ago. In order to meet the goal of 21.5 billion cubic meters for the year, deliveries must average 2.38 billion cubic feet daily the second half.

TREND OVER THE LAST YEAR

	Western Hemisphere less U.S.	Middle East	Total, Free World outside U.S.
1956—			
June	3,509.7	3,710.2	7,866.9
July	3,549.8	3,806.1	7,996.6
August	3,618.2	3,685.8	7,965.6
September	3,637.2	3,721.8	8,019.3
October	3,688.3	3,873.5	8,251.8
November	3,760.8	2,142.8	6,544.2
December	3,915.9	2,428.9	6,989.7
1957—			
January	3,993.9	2,645.7	7,301.7
February	4,040.7	2,855.5	7,561.6
March	4,117.8	2,764.3	7,582.0
April	4,111.5	3,140.0	7,985.0
May	4,116.0	3,556.1	8,407.3
June	4,145.0	3,957.5	8,857.2

World-Wide Crude-Oil Production

(Daily average in thousands of barrels)

Country—	June 1957	May 1957	June 1956
Western Hemisphere:			
Argentina	88.0	88.0	86.0
Bolivia	9.5	9.5	8.5
Brazil	22.0	22.0	5.7
Canada	522.0	529.0	440.8
Chile	11.6	11.2	9.8
Colombia	126.4	124.5	124.4
Cuba	1.0	1.1	1.3
Ecuador	7.7	7.7	9.5
Mexico	240.0	240.0	249.9
Peru	52.8	52.8	49.1
Trinidad	95.4	93.2	78.5
Venezuela	2,968.6	2,937.0	2,446.2
Total	4,145.0	4,116.0	3,509.7
W. Europe & Africa:			
Algeria	0.3	0.3	0.6
F. Morocco	1.6	1.6	2.1
Egypt	49.0	44.0	38.6
Austria	63.6	63.6	63.9
France	28.7	28.8	23.1
W. Germany	76.4	75.8	69.2
Italy	27.7	19.9	9.4
Netherlands	29.4	28.3	21.2
Turkey	6.5	6.5	5.3
United King.	1.6	1.6	1.4
Yugoslavia	7.6	7.6	5.3
Total	292.4	278.0	240.1
Middle East:			
Bahrain	30.1	30.1	30.1
Iran*	735.0	701.0	517.0
Iraq†	435.9	418.3	713.3
Israel	1.4	1.4	0.6
Kuwait	1,370.0	1,121.0	1,153.1
Neutral Zone	75.0	60.0	35.1
Qatar	145.8	125.0	123.7
Saudi Arabia	1,164.3	1,099.3	1,083.3
Total	3,957.5	3,556.1	3,710.2
Other Asia:			
British Borneo	120.0	120.0	116.2
Burma	5.0	5.0	4.9
India	9.2	9.2	7.5
Indonesia	310.0	305.0	259.6
Japan	5.9	5.8	6.2
New Guinea	6.3	6.3	6.7
Pakistan	5.9	5.9	5.8
Total	462.3	457.2	406.9
Free World:			
Foreign	8,857.2	8,407.3	7,866.9
United States	7,107.0	7,442.0	7,100.0
Total	15,964.2	15,849.3	14,966.9
Communist countries in Soviet orbit:			
Romania	220.0	220.0	200.0
Russia	1,930.0	1,910.0	1,600.0
Others	50.0	50.0	50.0
Total	2,200.0	2,180.0	1,850.0
World total	18,164.2	18,029.3	16,816.9

*Includes 4,000 bbl. daily from Naft-i-Shah field not operated by consortium companies.
†Includes estimated 5,000 bbl. daily from Naft Khaneh field, operated by British Petroleum Co.

Figures are from reliable industry reports or official government sources. Data for Communist countries in the Soviet orbit, which includes the European satellites and Red China, are based on competent estimates. Authentic information is not available on month-to-month production in these areas. Estimates also were made for those countries, particularly in Southeast Asia, where complete reports are lacking.

India Crude Line Pushed

BURMAH Oil Co., Ltd., is pushing plans for an 850-mile, 20-in. pipeline to transport crude from Nahorkatiya field in northeastern India to Calcutta.

The company has let contracts for 40 to 50 river crossings to Collins Construction Co., Houston, marine pipeline specialists. Collins has a crew in India surveying the route for exact crossing locations. These surveys are expected to continue for the rest of the year.

The Indian Government has tentatively decided upon Barauni, 250 miles northwest of Calcutta, as the location for a 40,000-bbl. refinery to process Nahorkatiya crude.

If the refinery is located at Barauni, a 600-mile line would be built to this point, with a 250-mile extension being added later.

In third try at completion . . .

. . . Second Offset Blows Wild

VENEZUELA'S BIGGEST oil producer was struggling last week to control a wild Lake Maracaibo well, the second blowout it has had since it has tried to complete a well off Bachaquero field.

The well, Creole Petroleum Corp. B-260B, blew out and caught fire, toppling its derrick about 6½ miles southwest of Bachaquero field on the east shore of the lake. The test which is causing the trouble is the second offset drilled as a substitute for B-260.

B-260 was originally completed in March 1953 as a noncommercial producer at 5,050 ft. In October 1954, the company tried to deepen it to the Eocene but had to give it up after losing tools in the hole. Then an offset, B-260A, was drilled. The offset blew out in June of this year when a workover was attempted.

After several days Creole decided it would be impractical to try and put out the blazing well, but the well solved the problem itself. It sanded up and the fire went out.

Last week's wild well was the second offset. It blew out after drill pipe was lost in the hole.

The Creole blowout is about 18 miles north and 7 miles west of Mene Grande Oil Co.'s spectacular blowout of last year, Ceuta 1.

One of Ceuta's offsets, the San Jacinto Marlago 1, 3½ miles to the west, shows every appearance of becoming a good well.

San Jacinto Exploration Co., operator of the 2,000-acre national reserve tract in which it holds a 30 per cent interest, has landed 9⅝-in. casing to 11,410 ft. after logging 150 ft. of Miocene pay at high pressures.

San Jacinto plans to deepen the well to at least 14,500 ft., hoping to penetrate at least seven Eocene sands. This total projected depth is 1,500 ft. deeper than originally planned for the well (OGJ, Sept. 2, p. 84).

Reds do it with asbestos cement:

Piping Sour Gas Without Rust

RUSSIA'S NATURAL GAS from "Second Baku" area has posed a tough problem.

Heavily laden with hydrogen sulfide, it corrodes steel pipelines within a year. And the country can't turn to plastics—they are in short supply.

But Russian engineers now think they have found the answer. They are calling for increased production of asbestos-cement pipe to move the sour gas from Bashkiria's Ishimbai fields.

To a lesser degree, the Russians have been troubled with pipe corrosion in the Kuibyshev, Chkalov, and other gas-producing areas east of the Volga River.

To whip the problem, several Soviet research institutes are working on improved asbestos-cement pipe capable of handling operating pressures up to about 150 psia. Thickness and volumetric weight of the walls in this pipe are about 20 per cent greater than for asbestos-cement water pipe used in Russia.

Construction of a 19-mile asbestos-cement gas pipeline with flanged cast-iron unions is planned in Bashkiria. The cast-iron unions are considered preferable to the asbestos-cement unions now in use.

Already proved . . . Asbestos-cement pipe was successful in transporting gas saturated with hydrogen sulfide as early as 1943, according to engineers working on the project.

The first use in the Soviet Union was on a 12-mile section of the Burguruslan-Kuibyshev line. The 12-in. pipe transported gas at a pressure of about 88 psia.

A 5-mile section of asbestos-cement pipe designed to carry gas from the Andizhan fields in the Uzbek Soviet Socialist Republic in Central Asia at about 45 psia. operating pressure was built in 1944 and still provides trouble-free service, according to the Russians. Russia also had this to say about the pipe:

It is not subject to soil corrosion and does not require an anticorrosion outer cover. It has very little linear expansion, thus eliminates temperature deformation and stress. The cost is about one-half to one-third that of steel or iron pipe.

New Grants Ready

Guatemala plans second series of concessions

THE GUATEMALAN Government may soon grant a new series of concessions to foreign oil companies.

It has already assigned 38 blocks totaling nearly 9,000,000 acres to 20 companies, most of them United States based. The awards were made on the basis of bids made between July and November 23, 1955, following approval of the country's new oil law.

The second round of grants will be based on bids made after the November 1955 deadline. Since then, companies have made 102 new applications on a net area of more than 13,600,000 acres.

The government has already made the first award in the second round. It granted a 382,617-acre block in El Peten to Esso Standard (Guatemala), Inc. The company won two blocks in the first round of bidding. Both were in El Peten, covering 304,321 and 61,493 acres.

Sloane Exploration Co., Houston, was the first company to move in a rig on its acreage. It is drilling a well on its Morales concession 35 miles southwest of Puerto Barrios. Ohio Oil Co. plans to drill its first test on a block near the Mexican border next year.

Cuban Well Has Big Flow

CONSOLIDATED Cuban Petroleum Corp. has brought in another well with initial flush production in Bacuranao field 11 miles east of Havana.

Until the well was capped, crude rose 30 ft. in the air through 7-in. casing. Initial open-flow output was estimated at 1,000 bbl. daily.

Consolidated Cuban had at least two other comparatively prolific wells in the area. But these wells later died down.

The 1 Consolidated Cuban flowed more than 520 bbl. daily for 2 months last year, and the 2 Consolidated flowed 1,786 bbl. for 3 days before quitting.

German Runs Jump

Fuel-oil output will pace refinery operating gains

WEST GERMAN refiners expect a lopsided gain in fuel-oil output to set the pace for a whopping 19.7 per cent increase in refinery runs next year.

The country's refining association foresees a throughput of 320,000 bbl. daily in 1958. The anticipated yields show another big step away from the pattern of U. S. products production, which is dominated by gasoline.

Residual fuel-oil output is expected to rise 54 per cent to 81,600 bbl. daily. It still is the third ranking product. But the leader, gasoline, will rise a comparatively small 8.4 per cent to 91,000 bbl. daily. Second-place diesel oil will rise 7.4 per cent to 83,400 bbl. daily.

Asphalt production will average 15,400 bbl. daily, and L.P.G., 14,200 bbl. daily. Kerosine and jet fuel, lubricating oil, other products, and losses will account for the remaining 43,400 bbl. daily.

Crude sources . . . Refiners will get nearly a quarter of their supplies from the well-protected domestic crude producing industry. Intake of local crude will be about 74,000 bbl. daily.

Kuwait will supply 73,000 bbl. daily, Iraq 59,200 bbl. daily, Saudi Arabia 39,700 bbl. daily, and Venezuela 21,300 bbl. daily. Contracts for another 44,600 bbl. daily from either Saudi Arabia or Iraq also will be tied down. The remaining 8,200 bbl. daily will come from Mexico, Iran, and some other Middle East country as yet not determined.

All the major refiners are expected to share in the gain. Deutsche Shell A.G. will lead with a gain of 14,000 bbl. daily at its expanding Hamburg-Harburg refinery. Gelsenberg Benzin A.G. will add 10,000 bbl. daily as the result of a new crude unit being added at its Gelsenkirchen plant. BP Benzin and Petroleum G.m.b.H. will step up runs 7,000 bbl. daily at Hamburg.

Superior to Move Lake Crude

SUPERIOR Oil Co. is losing no time arranging to ship out its new Lake Maracaibo production.

Superior will haul its crude by lake tanker to the La Estacada terminal of Talon Petroleum, C.A., on the east side of the lake opposite the city of Maracaibo. From La Estacada, the crude will be loaded on ocean-going tankers.

Superior will build tanks of 55,000-bbl. and 180,000-bbl. capacity on Talon's property. This will boost available storage to 370,000 bbl.

Of the newcomers to Venezuela's Lake Maracaibo, Superior was the first to find oil. It has completed two wells good for 10,900-bbl. daily on a wholly owned concession of 7,774 acres (OGJ, Sept. 2, p. 83).

Israelis Find Gas

Test blows out, air force plane sprays, douses fire

ISRAELI OIL HUNTERS had another sign of encouragement last week in their intensive search for more crude.

A wildcat 11 miles south of Heletz field encountered gas. Israel Oil Prospectors Corp., Ltd., and Lapidoth Israel Petroleum Co., Ltd., operators at Heletz, made the strike on their Beeri license immediately south of the Heletz concession. Beeri is bounded on the west by the Gaza Strip.

The gas ignited and flames reached 120 ft. The well burned for 24 hours until killed by a unique method. The Israelis said an Israeli Air Force plane doused it with a high-pressure spray of the type used to dust crops. The well was then capped and is now awaiting tests.

Israel Oil and Lapidoth had drilled a dry hole in the Beeri area as one of their first attempts to find crude in the Western Negev Desert. The test was one of the three drilled before the Heletz discovery.

This spring, the companies began taking a fresh look at the area with a structural drilling program.

To the north, the 2 Brur was completed as a producer at 5,000 ft. Brur is believed to be a separate pool on the Heletz structure. It is about 2 miles south of the Heletz.

Austrian Gas Line Started

AUSTRIA started a major expansion of its natural-gas distribution system last week.

NIOGAS, a state-owned company, has let contracts for a 160-mile transmission line to Williams Brothers, Tulsa pipeline designers and constructors, and Costain-John Brown of London.

Engineering has been completed on the 6, 8, 10, and 12-in. system which will be built in the State of Lower Austria. The line will be built from Fischamend field, some 30 miles from Vienna, to Vienna and nearby cities.

The system, which will transport 50,000,000 to 60,000,000 cu. ft. daily, will be completed next fall.

——— *World* briefs

Edwin Pauley, California independent operator, plans to spud his second Jordan test 12 miles north of Jerusalem in the near future. His first test, 50 miles east of Amman, is drilling ahead at around 4,000 ft. There have been no shows. Projected depth is 10,000 ft.

Parker Drilling Co. of Tulsa is the contractor. The Parker rig will be skidded to the new location after the first well is drilled. Pauley's concession covers one-third of the country and is good for 55 years.

Sicily's Ragusa field is fast developing into Western Europe's top producer after Austria's tiring Matzen-Auesthal. Gulf Italia Co. expects to average 29,800 bbl. daily this year, and 39,800 bbl. daily in 1958 when 22 wells will be on production.

The Texas Co. has wrapped-up its purchase of Antilles Petroleum Co. (Trinidad), Ltd., from McColl-Frontenac Oil Co., Ltd. The $14,700,000 deal gives Texaco an additional 6,000 bbl. daily crude production on Trinidad, most of it from slanthole wells under the Gulf of Paria.

Caltex Oil Refining (India), Ltd., has opened its new 13,500-bbl. refinery at Visakhapatnam, midway down the east coast of India on the Bay of Bengal. The $29,000,000 plant will supply gasoline, kerosine, diesel, and fuel oils to the Visakhapatnam and Calcutta areas.

The East German Government plans to expand the Wintershall refinery south of Leipzig to 10,000 bbl. daily, making it the largest plant in the Soviet zone of Germany.

The construction program includes a lubricating oil plant which will have facilities for propane deasphalting, sulfuric-acid treating, and phenol extraction.

The new facilities at the nationalized plant will be completed in 1959.

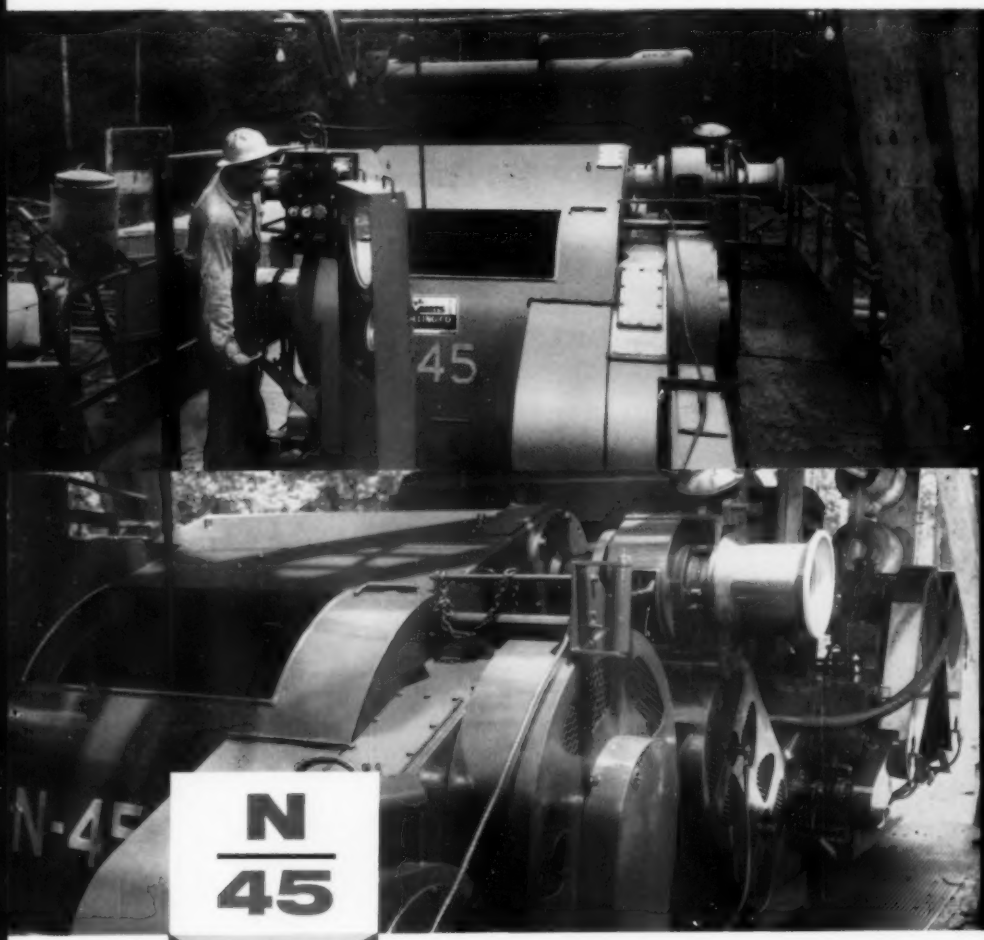
Creole Petroleum Corp. will lay 22 miles of additional aluminum pipe in the brackish waters of Lake Maracaibo in Venezuela. The 4-in. line will be welded and submerged in water up to 90 ft. deep. The line will move crude from wells to offshore flow stations. Creole laid the first underwater aluminum pipeline in the lake in 1955 to test its resistance to corrosion. When checked this year, the unprotected pipe was still in good condition.

Here is versatility and high production all in one low cost team . . . the Brewster N-45 and the Lee C. Moore Dual trailer 100 mast. This self-moving drilling combination is a winning team for many contractors . . . big enough to make hole fast, small enough to move in on shallow work or to drill to 6,500 foot . . . profitably.

Economical in first cost, the N-45 has field proved features that have given Brewster rigs their reputation for low operating costs.

Available in torque converter and mechanical designs, the N-45 can be ordered with the compound and power arrangement best suited to your individual needs. These options include: twin engines with individual torque converters, twin engines with midship torque converter, dual engines with chain compound and pump drive and single heavy duty engine without compound. All models have full air controls, enclosed oilbath chain drives, chain transmissions, big brakes and extra large drums.

For all the facts on this versatile drilling combination, write Brewster today or see your Brewster distributor.



PORTABLE AND RUGGED

Fast...

N 45

OVER 45 YEARS' EXPERIENCE

BREWSTER

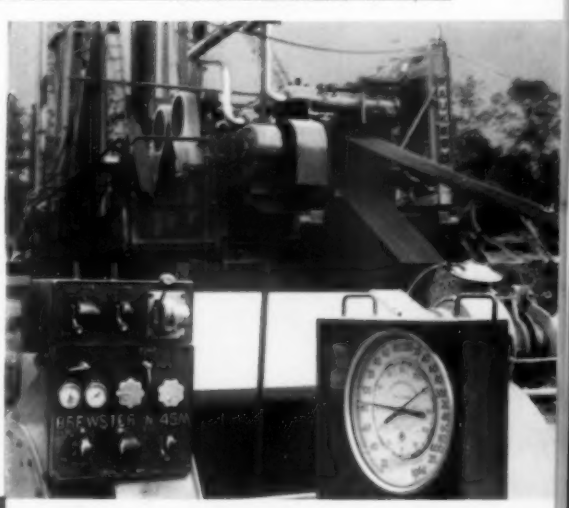
Shreveport, Louisiana

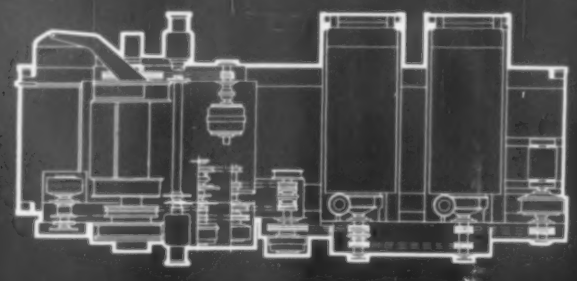
Single trailer mounted masts combined with the Brewster N-45 drawworks give maximum mobility and efficiency.

N 45

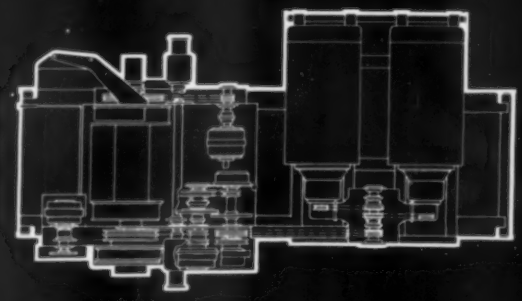
RUGGED COMPOUND

The N-45-M has a heavy duty chain compound with take-off to a pedestal mounted mud pump drive. The compound and engine are coupled by Fawick air clutches. A positive clutch on the inboard engine compound shaft permits the pump drive to be powered by one or both engines. A combination of oil bath and oil pressure lubrication is provided to chains and shaft bearings.





N-45-M—MECHANICAL DRIVE



N-45—TORQUE CONVERTER DRIVE

FULL AIR CONTROLS

Fingertip air controls on the N-45 give the driller instant positive command of the drawworks, compound, engines and pump drive. Hi and low drum speeds are obtained by a single dual position valve. The driller can shift from low to high without stopping the load.

VERSATILITY

The N-45 is designed in two basic models, one for use with torque converter drive and the other for straight mechanical drive arrangements. Both have chain transmissions with two forward speeds and a gear reverse furnished in torque converter models and four forward speeds and gear reverse in mechanical models. A wide choice of engine combinations and compound arrangements provide complete flexibility of make-up permitting you to match the rig with other equipment or to design it for a particular type drilling operation.

SPECIFICATIONS

Recommended Horsepower	450
Drum Spool diameter and length	18" x 40"
Net Braking Surface (Lining) Square Inches	1,728
Drum Brakes	8" x 40"
Hoisting Speeds	
Torque Converter Models – 2 Fwd., 1 Rev.	
Mechanical Drive Models – 4 Fwd., 2 Rev.	

THE BREWSTER COMPANY, INC.
Shreveport, Louisiana

SUPPLY HOUSES

Howard Supply Company • Apex Equipment Company • Bovaird Supply Company • Industrial Supply Company • Murray Brooks, Inc. • United Supply and Manufacturing Company • Export Sales: The Brewster Company • (HOMCO) Houston Oil Field Material Company, New York, N. Y., Houston, Texas; Mexico City, D. F.

A look at

Four Corners...
YOUNG OIL GIANT

Half-billion-barrel oil reserve.

Daily output estimated at **110,000** bbl. within 2 years.

Primary recoveries; **7,500 bbl. per acre** from the Paradox.

Pay zones are **Pennsylvanian limestones** at 5,500-6,000 ft.

Average **pay** thickness at Aneth, **50-60 ft.**

Aneth trend already 11 miles long and 4 miles wide.

Production related to **local closures** and **stratigraphy.**

Surface geology invaluable to date in pinpointing the fields.

Trends will extend into **Colorado, New Mexico,** and **Arizona.**

Excellent possibilities for **deeper production.**

70,000-bbl. per day **pipeline nearing completion.**

Contracts being let on a new 50,000-bbl. per day pipeline.

Land largely **federal, state,** or **Indian;** little fee land.

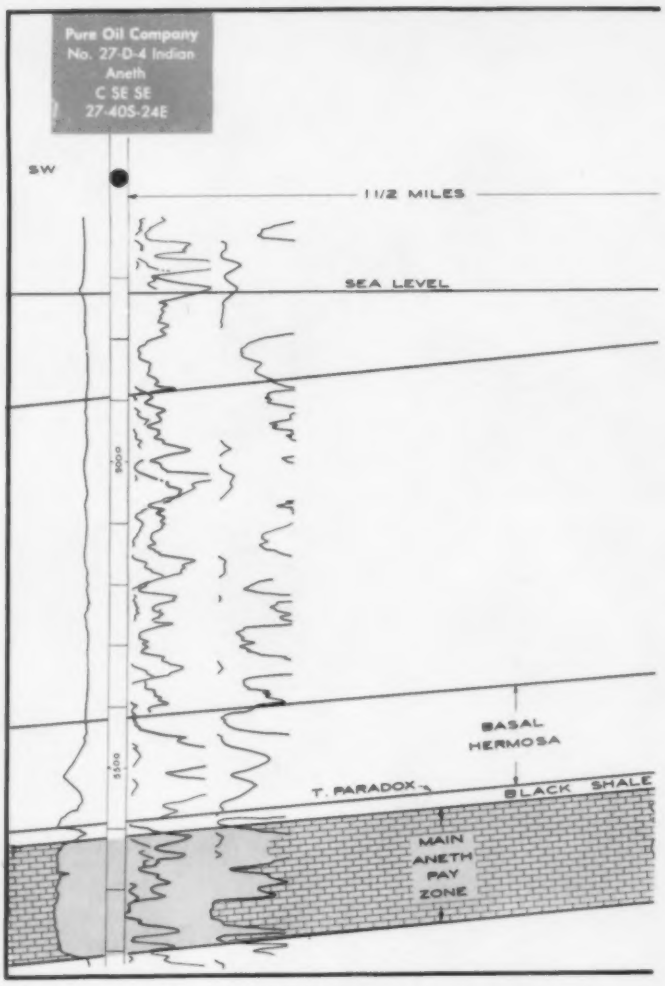
Lease costs high due to competitive bidding (sealed bids).

Farmout possibilities slim at the moment.

Wells expensive, $20-$25 per ft., for a producing field well.

OIL AND GAS
JOURNAL

RUGGED TERRAIN and remote well sites make exploratory tests in Southeast Utah an expensive venture.



ALTHOUGH PRODUCTION is related to reefoid limestones, Aneth has

Dry-Hole Graveyard to Major Province

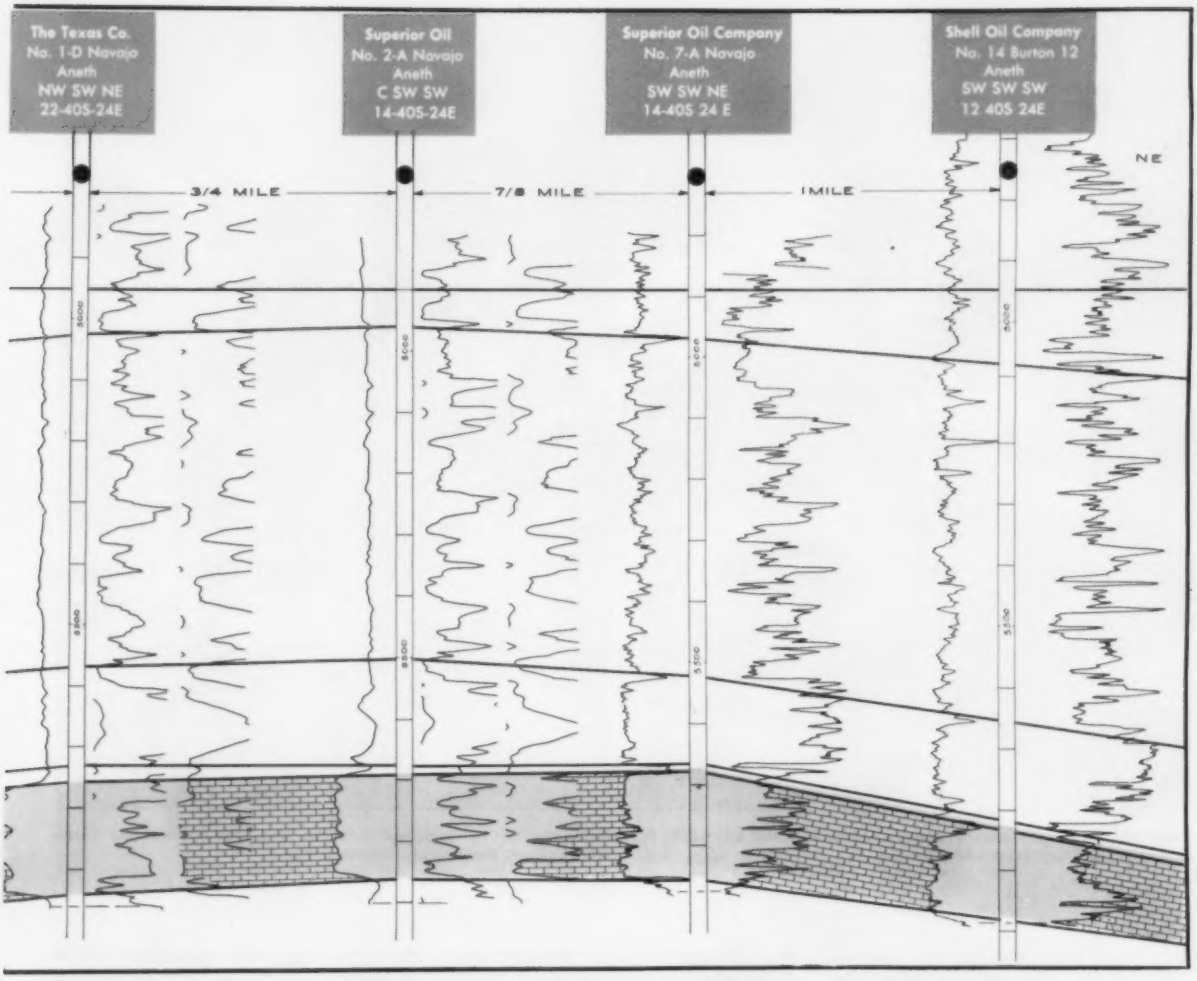
That's the 1½-year history of the "Four Corners"

By Norman S. Morrisey
Drilling-Development Editor

OVERNIGHT the Utah portion of the Four Corners area has been transformed from an undesirable dry-hole graveyard into an oil province with upwards of 500 million barrels of undeveloped reserves. Since the first key strike by The Texas Co. at Aneth 18 months ago, the outlook for the basin has been completely reversed. Four Corners Pipe Line Co. is currently completing a pipeline capable of carrying 70,000 bbl. per day to California markets. Texas-New Mexico Pipe Line Co. has a 50,000-bbl. pipeline past the drawing-board stage and contracts are now being let for it.

Reserves estimates for the new pay zones—the basal Hermosa and Paradox limestones of Pennsylvanian age—range from a conservative 5,000 bbl. per acre to over 10,000. Reliable consultants estimate reserves at 7,500 bbl. per acre along the Aneth trend (Fig. 1) by primary methods, although reservoir data released to date have been sketchy. Operators are reluctant to part with this valuable information with important lease sales in the offing.

Trend play under way . . . The Aneth trend has rapidly developed into a producing area 11 miles long and 4



125 ft. of relief at Paradox level and is evident as anticline in the overlying beds. Fig. 1.

miles wide with reserves conservatively estimated at 250,000,000 bbl. If the Bluff Unit proves to be part of the same oil field, the Aneth area could eventually cover 45-50 sq. miles.

Aneth is only a part of the rapidly expanding new oil province (Fig. 2). Production from the Paradox extends from Coalbed Canyon (35s-25e, San Juan County, Utah) on the extreme north to Rattlesnake and Hogback fields (29n-19w and 29n-16w, San Juan County, New Mexico) on the southeast, a distance of 80 miles. At the present time there are 35 rigs operating in San Juan County, Utah, the focal point of all Paradox basin activity.

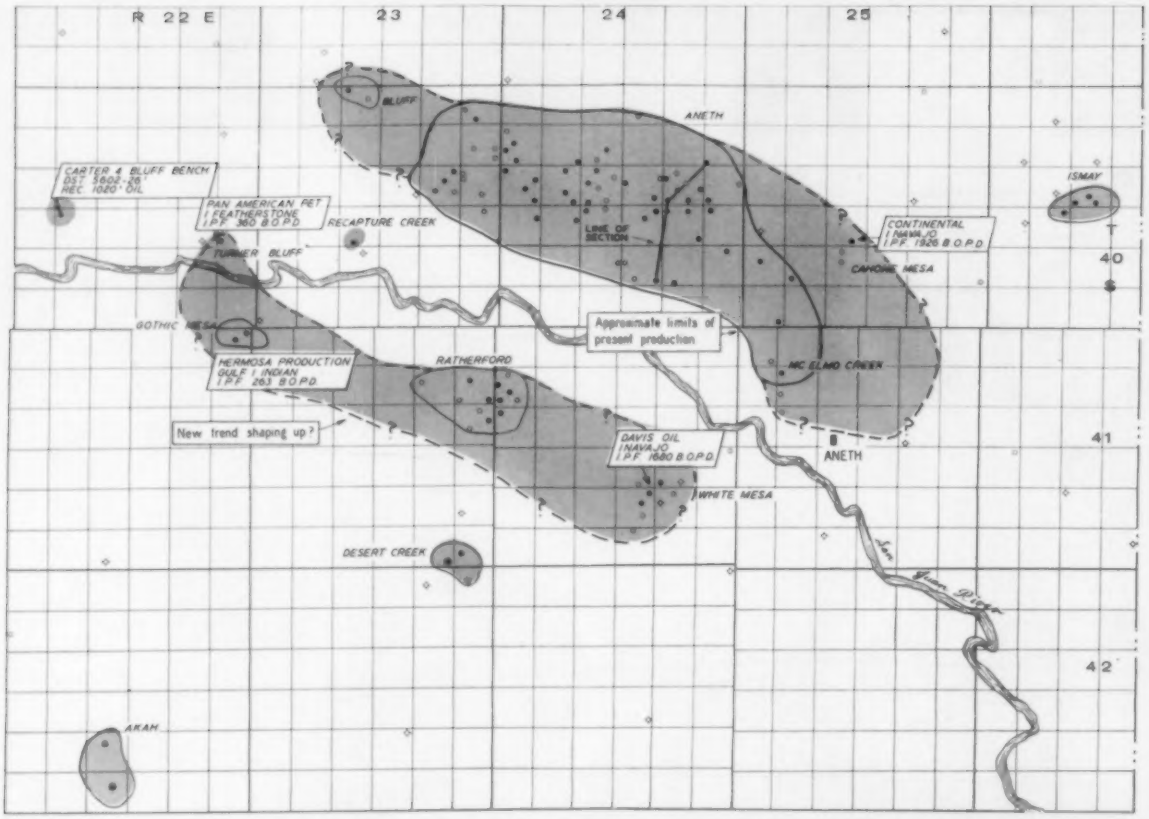
What controls production? . . . Two schools of thought exist regarding the Hermosa and Paradox production, one that the area is a huge stratigraphic trap; the other that production is from a reefoid-type accumulation with many individual fields and that locally the production is related to structure.

Known surface geology supports the reef theory with production confined locally along belts where reefs occur. The San Juan River has cut deeply into the Pennsylvanian outcrops in southwestern San Juan County, exposing the limestones of the Hermosa and Paradox. Geologists have conclusively shown that porous reefoid zones in these limestones can be traced for many miles along the outcrops, and these zones are probably the equivalent of the subsurface pay zones at Aneth.

Limited subsurface data too indicate that the oil production is related to reefoid buildups and to local closures that occur above the salt sequence of the Paradox formation. Individual black shale breaks separate the reefoid producing zones and these breaks can be traced for many miles in the subsurface. On the flanks of these reefoid masses, porous zones occur that are missing across the crest of the structure or reef. This accounts for "high but dry" tests on known structures.

Apparently these reefs built up on a foreland or a stable platform. To the northeast, reef experts delineate a backreef or an offreef facies. To the southwest the reefoid limestones lose their identity, grading into a marine facies that consists of dense limestones with little or no porosity. Similar conditions exist in known reef producing areas. Closures and production line up in belts or trends where the porous zones are well developed. The Aneth trend is a good example and another trend appears to be shaping up 6 miles southwest in the Ratherford-White Mesa-Gothic Mesa area.

Other geologists favor the strat-trap theory. They claim that eventually the Aneth trend will be one huge producing area with production controlled by lateral changes in porosity and permeability. Updip to the south-



PRODUCTION is from Pennsylvanian limestones at 5,800 ft. Notice that the oil fields are lining up in northwest-southeast trends and the Aneth trend already covers 44 sq. miles. (Base map courtesy of Petroleum Information, Denver). Fig. 2.

west, the beds become less porous and grade into dense limestones. Downdip the equivalent strata are impervious black shales. The porous zones developed in a foreland or shelf facies where climatic conditions favored the deposition of porous biostromal limestones. These geologists hope to extend the known trends by localizing where the porous foreland or shelf sequence was deposited (Fig. 4).

Which theory is correct? . . . At the moment the answer is purely academic. The end result in either case is the same, "How to extrapolate the present known producing areas into the unknown and acquire leases or farmouts that are favorably located." Both approaches stress stratigraphy to reach an answer. Certainly on the basis of present known producing areas, it's a safe bet to forecast a northwest-southeast alignment that extends from San Juan County, Utah, into northwestern New Mexico. There is Hermosa or Paradox production in northeastern Arizona and geologists forecast oil or gas fields for Colorado. Several surface anticlines in New Mexico produce or have produced Hermosa or Paradox oil. In this area, production to date has been related to structure. And as a matter of fact, the initial strike at Aneth was drilled on a known surface nose.

The geologic picture is clouded by the fact that uplift in late Cretaceous or early Tertiary time has obscured the true structural picture at the time of Hermosa and Paradox deposition (Fig. 3). Very similar structural conditions exist today in many oil provinces. In Oklahoma, for example, Pennsylvanian and Permian movements have masked the structural picture at Ordovician level. Similarly in West Texas the Permian structure does not accurately reflect the Ellenburger producing areas.

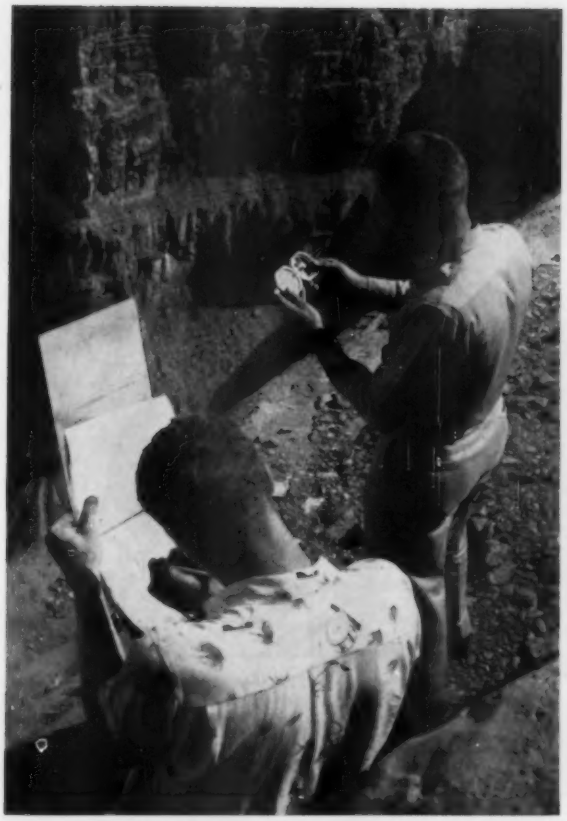
Where accumulation is directly related to structure in the Four Corners, the best prospects will be pre-Cretaceous anticlines and structural noses. And these prospects will harbor deeper oil and gas possibilities below the Paradox.

Salt anticlines . . . Along the northern half of the Paradox basin, flanking the Uncompahgre uplift, are a series of huge salt anticlines. These were the initial target for exploration in the early phases of the Paradox basin campaign. Drilling results, however, were most discouraging with no significant amounts of oil production from Pennsylvanian beds.

Geologists, however, have not completely written the salt anticline off as yet. The Hermosa and Paradox possibilities may be slim, but the deeper zones, the Leadville, Madison, Ouray, and Elbert carbonates are potential producing zones on these anticlines (Fig. 5). It is possible, from a geological standpoint, that these deeper zones could convert some of the salt anticline into oil fields.

Many of these salt anticlines are regional in size. Dolores can be traced for 30 miles along the surface outcrop. Dove Creek, a smaller structure, produced Paradox oil for a while, but it appears to be located too far to the northeast and does not have the porous limestone facies that are present at Aneth.

Land situation . . . To date the Aneth play has been strictly a major company play with Carter Oil Co., Shell



SURFACE GEOLOGY has been invaluable in pinpointing the early successes in this new oil province. Structures are low-relief and detailed work is necessary to map the surface leads.

STRATIGRAPHIC STUDIES have been the real key to success in finding the porous zones in the Paradox formations and localizing the trends. (Photo courtesy Carter Oil Co.).

Oil Co., Superior Oil Co., and The Texas Co. most active. Others represented are: Continental Oil Co., Pan American Production Corp., Honolulu Oil Co., El Paso Natural Gas Co., Ohio Oil Co., Davis Oil Co., and Paradox Production Co. Major oil companies have leased up much of the available acreage and are prepared to bid high at any Indian lease sales to commandeer the remaining acreage in the Four Corners that appears to be favorably located.

Very little acreage in the Four Corners is owned in fee. Indian lands comprise some 20,000,000 acres within a radius of 125 miles of the four-state intersection. The remainder is either state or federal land except for a small amount of fee land largely concentrated in the farming and ranching belt.

What does this mean? It practically eliminates the small operator, the lease broker, and the royalty buyer from the Four Corners play. Most of the federal and state lands have already been leased. Indian lands that are favorably located will be out of reach of the average small independent operator in the coming lease sales. And of course it is practically impossible to acquire royalty since so little fee land is available.

For these reasons, the independent operator must rely on farmouts and drilling deals. Even here he will have slim pickings because the majors are reluctant to relinquish any of this potentially valuable acreage. And to make the independent's plight even worse, the outlook is gloomy for any immediate change in the major companies' attitudes since they have long-term acreage for the most part. This means they can play a waiting game rather than process their acreage by the farmout route.

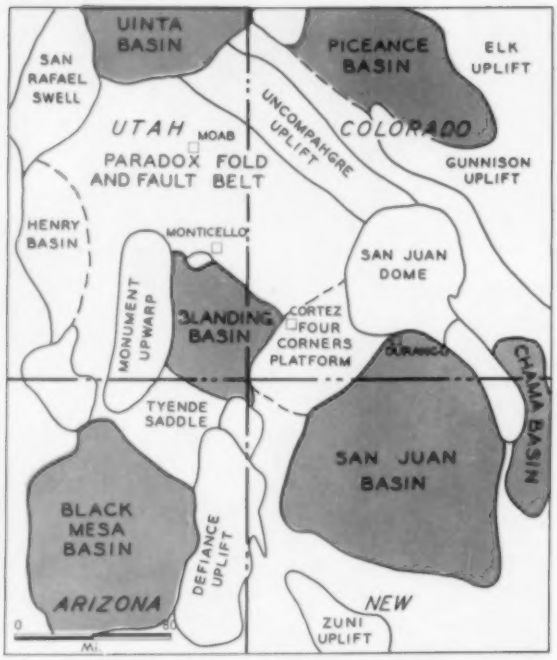
Geology

Geologists delineate three pronounced basins in the Four Corners area: Blanding, San Juan, and Black Mesa.

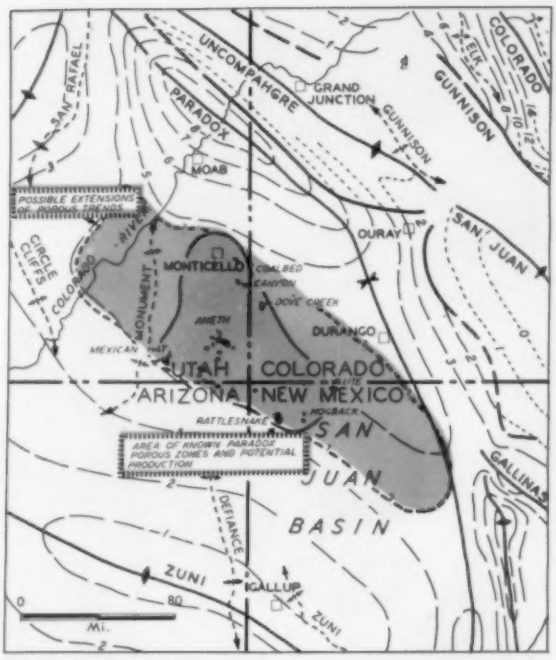
Prominent uplifts define the boundaries of the basins (Fig. 3) for the most part, although locally it is hard to pin point the exact margin of a basin. Late Cretaceous or early Tertiary orogenic movements have altered the older structural configuration of the Four Corners, and this, coupled with earlier movements, has made the structural and stratigraphic history of the basin a complex one. The importance of the geologic history and structural movements, however, cannot be overemphasized in finding oil in the Four Corners, especially in the pre-Cretaceous rocks. Geologists agree that these older and now masked structures should harbor oil reserves.

Geologic history . . . The features shown in Fig. 3 are quite young, having formed in late Cretaceous time or even in Tertiary. Little is known concerning the Precambrian structures. Probably the best clue to the Permo-Pennsylvanian structural elements is the isopach map (Fig. 4). This shows clearly that the structural elements at that time differed from the present ones (Fig. 3).

During Pennsylvanian and Permian times the dominant structural trends were oriented northwest-southeast. And this fact undoubtedly influenced the deposition of the oil-producing Hermosa and Paradox sediments. Thus, we can infer that the producing areas eventually will follow the



THREE BASINS are the scene of an intense exploration campaign aimed at extending known producing areas and finding new oil fields (after Kelly, "Tectonics of the Four Corners Region"). Compare with Fig. 4. Fig. 3.



BEST TIPOFF to where the Paradox and Hermosa may be expected to produce is an isopach map of the Pennsylvanian and Permian rocks. (After Kelly, "Tectonics of the Four Corners Region"). Fig. 4.

old strike lines as shown by the isopach map.

The fairly simple Pennsylvanian-Permian structural picture indicated in Fig. 4, however, has been severely altered by deformation and erosion that occurred:

1. During and at the end of Pennsylvanian-Permian time.
2. During Triassic and Jurassic times.
3. During late Cretaceous and early Tertiary times.

Notice on the isopach map the abnormally thick sediments deposited in the Paradox basin, lying to the southwest of the ancestral Uncompahgre uplift. The Paradox sea deposited the evaporite-salt section that basinward wells penetrate today.

On the shelf area, biostromal deposits were laid down that are today oil bearing (Fig. 6). Present subsurface data and paleogeography indicate that these deposits were reefoid in character. The Paradox sea probably was landlocked from time to time, accounting for the widespread salt-evaporite deposits. In the deeper portions of the basin, subsidence kept pace with deposition, giving rise to the thick sequence of Pennsylvanian - Permian rocks in this area. By the end of Pennsylvanian time the shallow Paradox seas no longer existed and Permian deposits are largely continental clastics and related rocks of little commercial value.

Apparently Triassic rocks were laid down over the Permian with only a minor erosional period separating the two systems. Minor subsidence and uplift occurred during Triassic and Jurassic, but in general the Four Corners was a fairly stable area. It should be noted that the salt anticlines were growing during this time.

Cretaceous time marked the beginning of a change from a relatively stable period to one of considerable instability. During late Cretaceous time or early Paleocene time, most of the present basins and uplifts were formed.

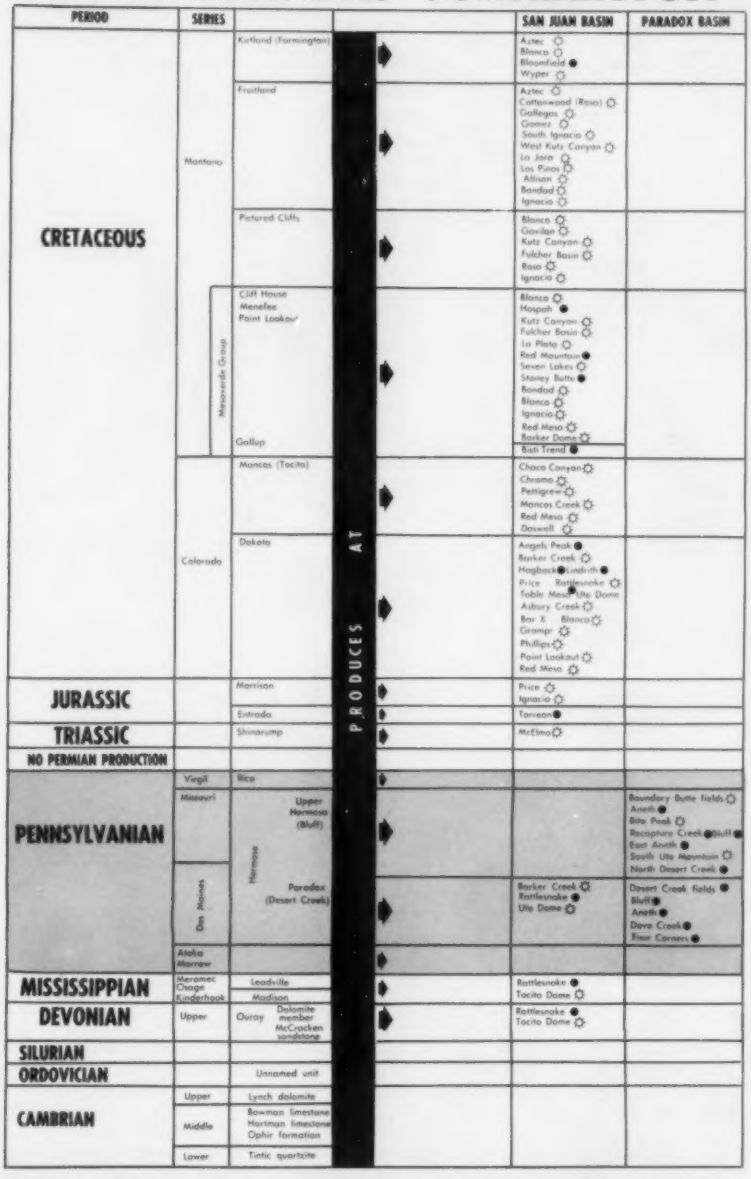
Basins . . . At the moment the oil industry is concentrating on the Blanding basin, in which lie nearly all of the Hermosa and Paradox producing areas. Blanding is smallest of the three basins in the Four Corners area and its boundaries are rather poorly defined. To the southeast it gradually merges into the San Juan basin, although it is separated from it by a subsurface feature, the Four Corners platform.

Structures in the Blanding basin are low-relief and trend either westerly or northwest-southeast. The largest of these is the Boundary Butte anticline that now has Pennsylvanian oil and gas production. The older lines of folding undoubtedly influenced the present structural trends. Although oil production depends to a great extent upon stratigraphic conditions, the initial successes were staked on surface anticlines or noses, i.e., Aneth, Boundary Butte, Bluff, Desert Creek.

Black Mesa basin lies entirely in Arizona and it, too, contains only low relief surface structures for the most part. The sedimentary beds range in thickness from 4,000 to 12,000 ft. Pennsylvanian and Permian beds reach a maximum thickness of about 3,000 ft. Although the present limits of Pennsylvanian production lie northeast of the Black Mesa basin, oil men cannot afford to overlook its oil potential. Here, as in the Blanding basin, the key to future oil production lies in an intimate knowledge of the stratigraphy and geologic history.

San Juan basin is the largest of the three basins in the Four Corners and is a pronounced intermontane basin. Within the San Juan basin is the large Blanco gas field, a huge stratigraphic trap. Around the flanks are many low-relief anticlines; many of them are already producing oil and gas from Cretaceous rocks. And a handful of fields in northwest New Mexico produce either oil or gas from pre-Cretaceous reservoirs. These fields may well provide the clue to future oil re-

FOUR CORNERS CORRELATOR



MANY POTENTIAL pay zones with excellent possibilities from pre-Pennsylvania rocks are offered by the Four Corners. Three structures in New Mexico produce from the Paradox. Fig. 5.

serves in both the Pennsylvanian and the older rocks (Fig. 4).

Paradox and Hermosa production . . . Although there is strong evidence to support the idea that the Pennsylvanian production is from reefs, at the same time there is enough structure evident on many of the producing fields to permit geologists and geophysicists to map them with a fair degree of accuracy. The 1957 exploration scoreboard for San Juan County, Utah, shows 9 discoveries and only 29 dry holes during the first 6 months. This cannot be due to pure chance alone but to sound scientific thinking that combines surface and seismic mapping with an intimate knowledge of stratigraphy.

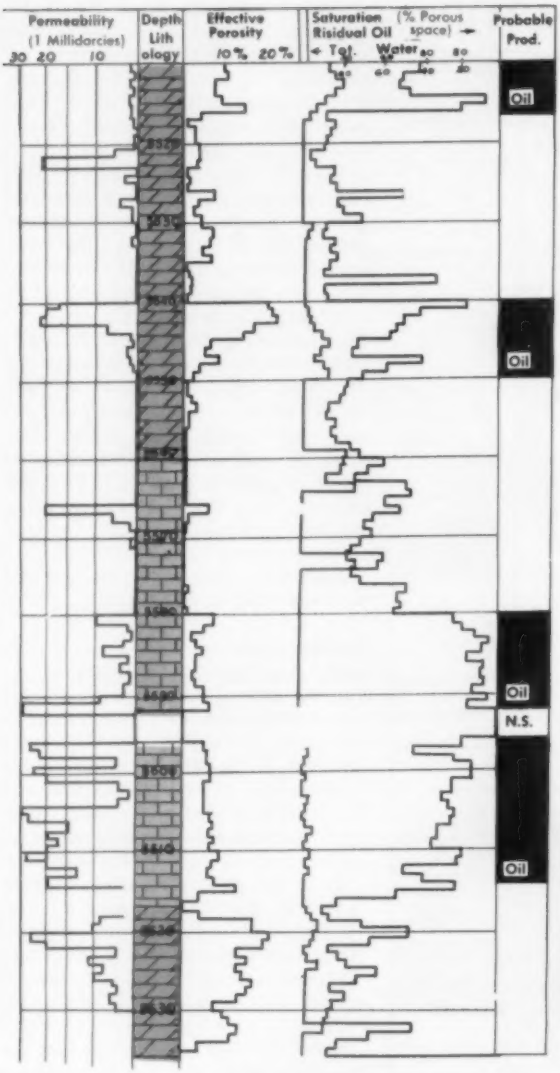
Top discovery of 1956 was Aneth, and the field has not been fully outlined. Aneth has approximately 125 ft. of relief at Paradox level and an oil-water contact has been established in one of the producing zones (Fig. 1).

Limited data released to date indicate that Aneth, and probably the other Paradox and Hermosa fields in San Juan County, Utah, will have a gas-in-solution type of drive. This means that ultimate primary recoveries will probably fall in the 5,000-10,000-bbl. per acre category. Secondary-recovery projects will boost the ultimate recoveries appreciably if successful. On 40-acre spacing the wells should prove economic, but operators favor 80-acre spacing to insure a profit. Along the Aneth trend, the producing zone is only 50-60 ft. thick on the average, but this compares very favorably with Canada's Leduc reef where similar production from the D-3 reef is only 35 ft. thick. The principal pay zone is the Paradox along the Aneth trend, although the basal part of the Hermosa is oil or gas-bearing locally (Fig. 5). The production in the Paradox occurs in a fossiliferous, porous, locally crystalline limestone or dolomite (Fig. 7).

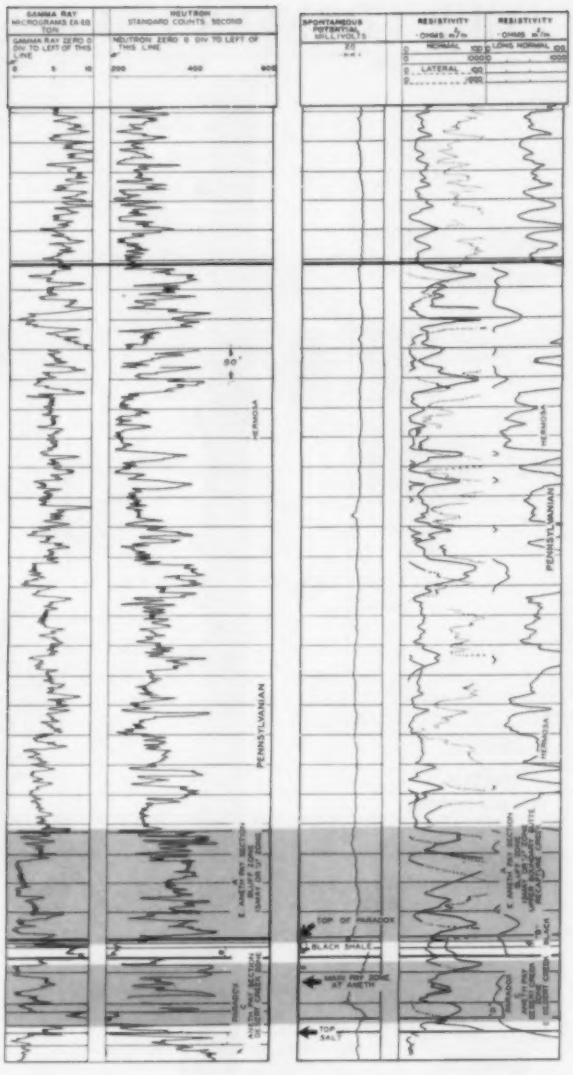
Drilling costs . . . Wells are expensive in the Aneth area. The inaccessible locations, lack of water and roads, rugged terrain, and severe climate make the wells cost much more than those of comparable depths in nearly all parts of the United States. The cost of building a road and getting equipment to the location may equal or exceed the cost of drilling and completing the well. Of course, as more wells are drilled, the costs will drop. Today field wells run an estimated $120,000 into the tanks at Aneth. Wildcats come higher. One operator states that an exploratory test to the salt will cost a minimum of $125,000 if dry and cites one 6,000-ft. test that cost $254,000. On this test, the operator ran casing in an effort to complete the well.

Field wells are drilled on a footage basis and the price now hovers at $8.50 per foot. Coring and testing run the price up on most field wells, but these costs will be reduced or eliminated as development drilling proceeds. Along the Aneth trend field wells average 5,800 ft. to the producing zone.

Outlook . . . Attention at the moment is on the Pennsylvanian production principally from porous limestones in the Paradox formation. However, the outlook is excellent for deeper production from pre-Pennsylvanian carbonates and a Devonian sandstone, the McCracken. Many of the wells penetrating these rocks have logged shows of oil or gas and it is only a question of time before they produce. And the Tintic quartzite of Cambrian age has yielded oil shows in a few wells. Thus no structure can be con-



CORE ANALYSIS from the lower Hermosa or "A" zone in the Carter Oil Co. 1 State Woolley (SW SW Sec. 16-40s-26e). Operator completed the well from perforated interval, 5,562-97 ft., for an initial potential of 672 bbl. per day after acid treatment. Fig. 6.



POROUS LIMESTONES in the upper part of the Paradox are the main producing zones in San Juan County, Utah, although the basal Hermosa limestone or "A" zone also is oil bearing locally. Fig. 7.

demned until all these deeper pays have been adequately tested.

At the moment operators are developing the obvious prospects, those that can be mapped by surface geology or with geophysics. With the subsurface control continually growing, and the successful application of geologic thinking, we can expect more new oil fields that will eventually put the Four Corners into the billion-barrel bracket.

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Geological Symposium of the Four Corners Region, October 1, 1952, published by the Four Corners Geological Society.

PRINCIPAL PRODUCING ZONE is the Paradox in Southeast Utah where it is a porous fossiliferous limestone. The producing portion is a reefoid type limestone, although structure is important in trapping the oil.

MISSISSIPPIAN CHERT

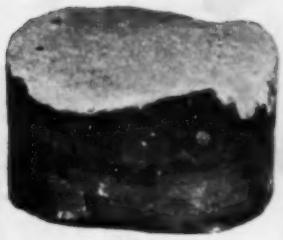
Kay County, Oklahoma

Responds well to Sandfrac*. Typical treatment: 750 gals. refined oil per foot of pay, and 1½-2 lbs. sand per gal. Injection rate: 30 BPM. Petrojel* successful but use limited by lease crude storage cost. Excellent results with Riverfrac*, but water shortage limits its use here.

YATES

West Texas — New Mexico

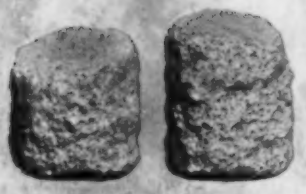
In certain areas, such as Shafter Lake Field, Andrews County, Texas, Riverfrac has been successful in many wells after all other treatments had failed. Typical treatment this field: 35,000-40,000 gals. fresh water, 20,000 lbs. sand. Injection rate: above 25 BPM recommended.



"D" SAND

Denver — Julesburg, Colorado

BHT frequently exceeds 225° F. Sandfrac, using refined oil, preceded by Mud Acid, generally used. Results vary widely, depending on degree of depletion. Typical treatment: 400 gals. Mud Acid, 10,000 gals. oil, 10,000 lbs. sand. Injection rates: 5-10 BPM through tubing, 10-20 BPM through casing.

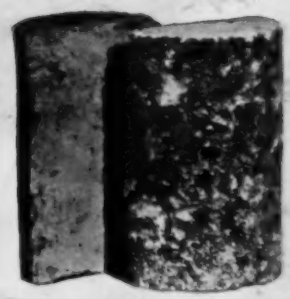


LOWER FRIO

South Texas

Treatment of tight intervals depends mainly on depth and bottom hole temperature. Petrofrac* recommended for shallow wells with BHT under 150° F; Petrojel where BHT range is 150° F—180° F. In deep, high BHT wells, Stratafrac* or Acid Petrofrac* gives excellent results.

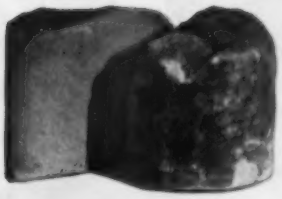
Dowell guide to fracturing



MISSISSIPPIAN CHAT

Barber County, Kansas

This formation, although only slightly soluble in acid; responds well to Acid Petrofrac. Typical treatment: 1,000 gals. fluid and 1,000 lbs. sand per foot of perforation. Injection rate: 30 BPM. Results on gas wells generally ten times drill stem test.



TENSLEEP

Big Horn Basin, Wyoming

Tight Pennsylvanian Sandstone, usually requiring high injection pressures. Normal treatment is down tubing. Widely varying depths and BHT. Petrojel successful in shallower sections where BHT is under 180° F; Sandfrac, using refined oil, preferred in deeper wells with higher BHT.

CARDIUM CONGLOMERATE AND SAND

Pembina Field, Alberta

Conglomerate interval normally prolific without stimulation. Sand usually requires fracturing. Sandfrac, preceded by Mud Acid, gets good results. Typical treatment: 500 gals. Mud Acid followed by 20,000-30,000 gals. lease crude with 40,000 lbs. sand. Injection rate: 20-30 BPM.

These cases give general information about treatments which have been successful in the formations shown. However, each well has its own unique characteristics which require the attention of experts. Dowell engineers have gathered performance data from fracturing operations in most active fields in the United States and Canada. Chances are that they already have the answer to your particular treating problem. If not, the Dowell laboratory and engineering staff is at your service. Dowell Incorporated, Tulsa 1, Oklahoma.

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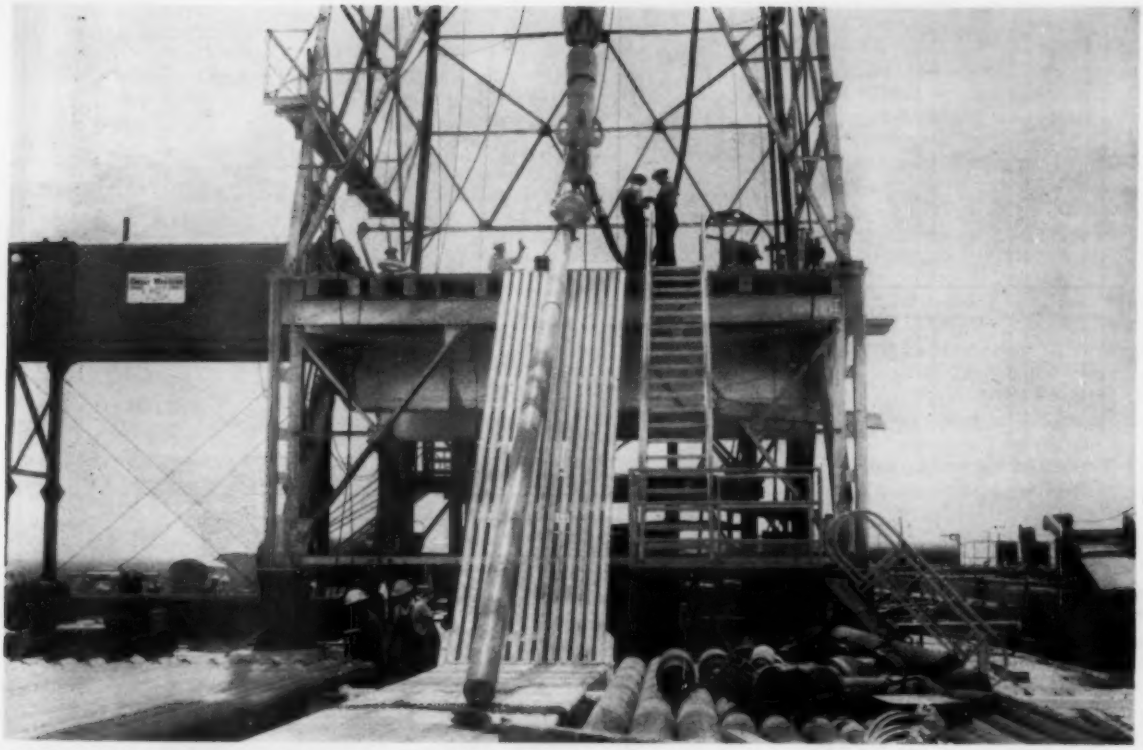


LESS THAN 3 DAYS were required to move this big rig 125 miles, rig up, and spud. This speed is due to the flexibility of the electric power system. Fig. 1.

G.W.'s Big Rig Flexes Its Muscles

. . . Will tackle a 22,000-ft. hole on its first job

By Ed McGhee
District Editor

GREAT WESTERN Drilling Co. didn't waste time drilling a shallow well to "shake down" its new diesel-e'ectric Rig 44. The very first hole the rig moved onto (shown in Fig. 1) is scheduled to drill to 22,000 ft.

If it makes that depth, this well, Phillips Petroleum Co.'s and Sinclair Oil & Gas Co.'s 1-A Montgomery will be Texas' deepest. Present Texas depth record of 19,060 ft. is held by Magnolia Petroleum Co.'s 417-A West Ranch in Jackson County. World's record drilling depth is 22,570 ft., reached by Richardson & Bass in its 1 L. L. & E. in Plaquemines Parish, Louisiana.

Rig 44 is a good one to try the 22,000-ft. depth; it's the biggest rig in West Texas. Draw-works motors are rated at 2,000 hp. for hoisting, and total engine horsepower on the rig is more than 3,600 for intermittent service. In spite of this huge size, the e'ectric drive and good planning have made it possible to move the rig and rig it up quickly.

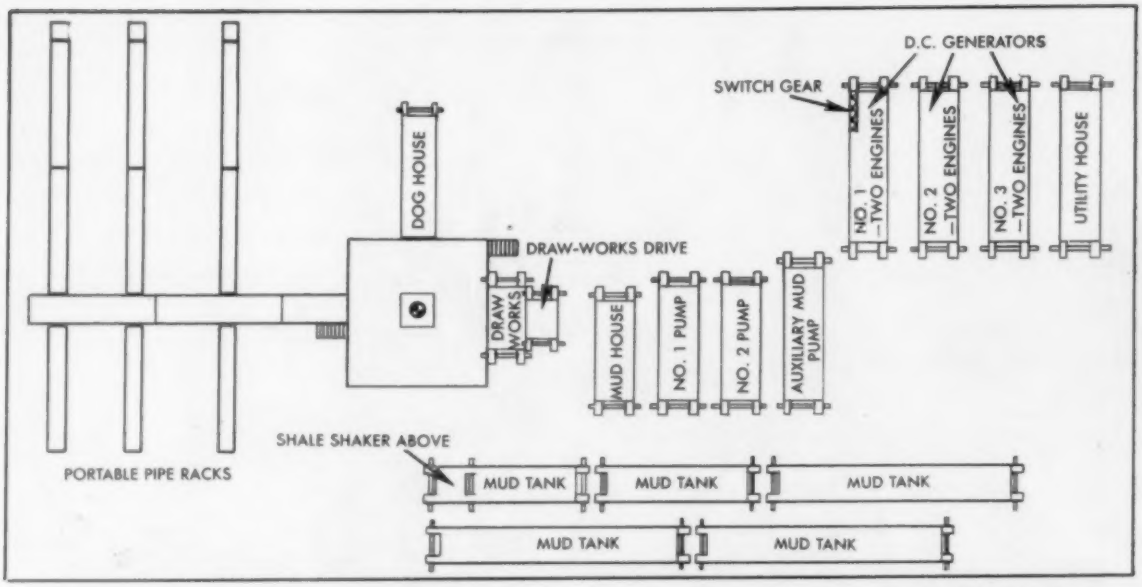
Electric-drive packages . . . Fig. 2 is a layout of Rig 44. There are four d.c. motors driving the drilling equipment—two on the Unit Rig U-1220 draw works and one each on the two D-700 Emsco mud pumps. See Figs. 3 and 4. The motors are shunt-wound General Electric GE752H's, rated at 625 hp. continuous and 1,000 hp. intermittent.

Power for these d.c. motors comes from the three power packages shown in Fig. 5. Each of these packages carries two Cummins LRT-600 turbosupercharged diesel engines. As Fig. 6 shows, these engines sit "back-to-back" on the skid with a GE752K generator between. Each engine is connected to its generator through a friction clutch and a flexible coupling. Thus, the generator is driven from both sides.

The four motors are interchangeable with each other; the three generators are also interchangeable. Armatures are interchangeable between all motors and generators.

The turbosuperchargers on the diesel engines are not the same as regularly come on that particular model; they were put on special by Great Western. With these special superchargers, the engines which normally have a maximum rating of 450 hp. can pull up to 500 hp.

Diesel now, gas later . . . Rig 44 is Great Western's first electric rig, but will not be the last. With this in mind, Great Western designed Rig 44's power plant so that it can be interchanged

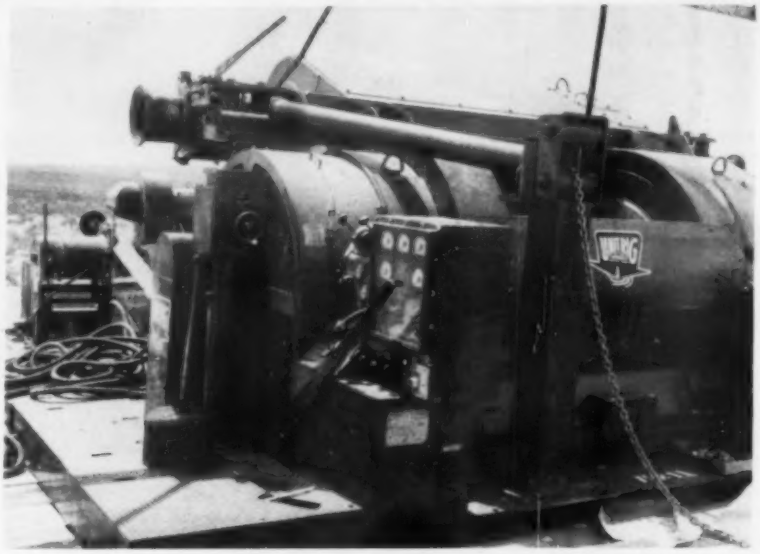


EASY LAYOUT of rig equipment is made possible by electric power packages. Equipment aligning time is eliminated. Fig. 2.

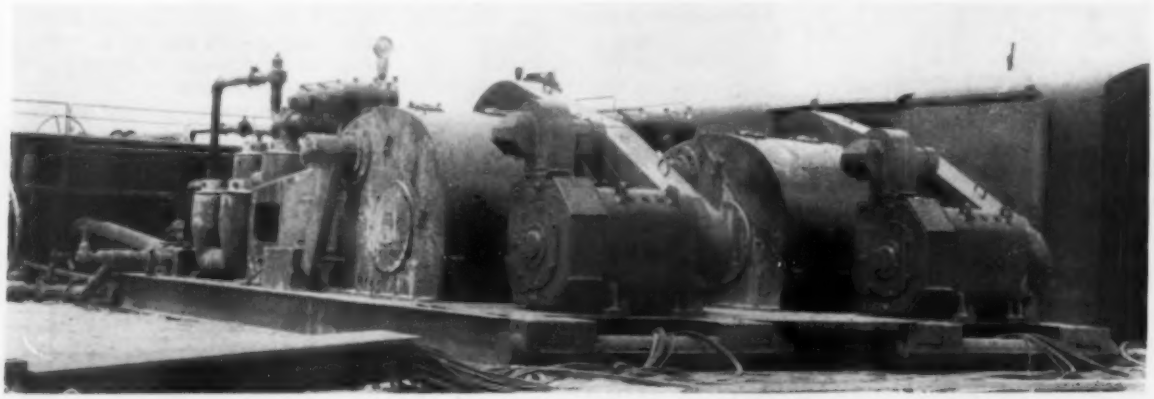
with similar plants from upcoming rigs.

Rig 44's engines are diesels; diesel engines are generally cheaper on remote wildcats like the 1-A Montgomery. However, later power plants will have gas engines. Then, if gas is available to the location, Great Western can swap out the diesel power plant for a gas power plant. Company engineers figure they can pull out the diesel-engine skids and put in gas-engine skids while the crew has the pipe out of the hole to change bits. There would be only a few electric conductors to pull loose and about half-dozen unions to break.

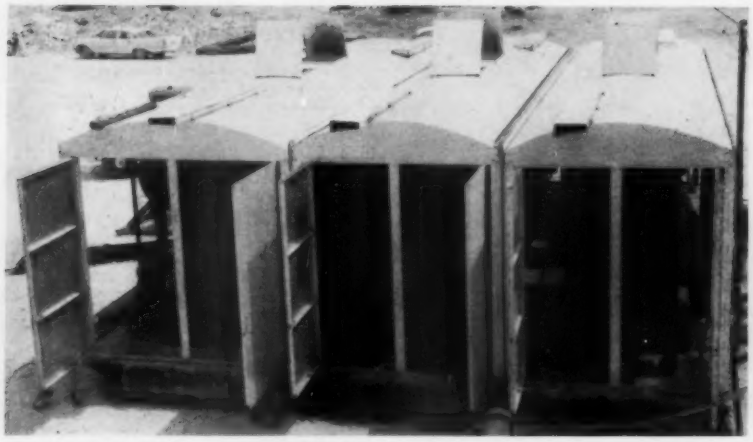
Simple to operate . . . Notice in Fig. 3 how simple the driller's controls are. He has only three electric switches to operate—one to assign each of the three power skids to its load. Each power skid may be switched so that it can be put on one of the pumps



HEAVY DRAW WORKS is driven by two d.c. motors. The controls allow the driller to assign power from each of the power skids to any load. Fig. 3.



MAIN PUMPS are each driven by a d.c. motor. Rating of the motors is 625 hp. continuously. Fig. 4.



POWER PACKAGES contain two diesel engines back-to-back with a generator between them. The three generators are interchangeable. Fig. 5.

or on either of the two draw-works motors.

Lights on the driller's console show which of the engines are running. Moreover, there are ammeters to show the load on the individual d.c. motors.

Central switch gear is mounted on one of the power skids shown in Fig. 7. This arrangement simplifies connections to be made in rigging up. The reels in Fig. 7 store the electric cable during moves.

Rig 44's auxiliary brake is an Elmagco magnetic-particle brake rated for 100,000 ft.-lb. See Fig. 8. Resistance of the brake is controlled by varying the electric current in the brake's field. Because of the iron particles in the air gap, the brake can stop the draw-works drum completely and hold it up to rated torque. As a result, the magnetic-particle brake can be used as a feedoff control.

Draw-works drum clutches are air-operated.

For this well . . . For the 1-A Montgomery, Great Western has modified its standard big-rig layout. First, to make plenty of room for blowout preventers under the floor, the derrick substructure has been raised by means of concrete blocks and steel posts at the corners. In this way, the rig has 21½ ft. under the floor on a 14-ft. substructure. With so much clearance, it should be possible to remove a strut from the substructure and back a gin-pole truck under the floor to handle the preventers.

To keep down mud-pump pressure and to get good hydraulics, Great Western plans to use no drill pipe smaller than 4½-in. o.d. As depth nears the 22,000-ft. mark, the tensile load on the 4½-in. will be so high that an extra-high-yield-strength pipe is needed.

Traveling block is a six-sheave, 500-ton Reagan and drilling line is 1⅜-in. diameter. Drilling started with eight lines strung, but drillers will watch fast-line pull as depth increases. Number of lines will go up accordingly, and Great Western figures 12 lines will be needed near total depth.

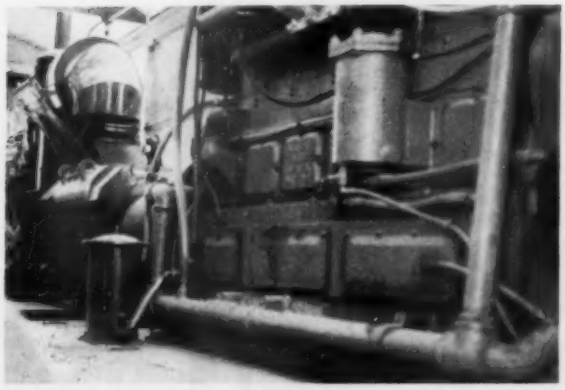
Instead of the usual three steel mud tanks, Great Western has placed five on the 1-A Montgomery. Shown in Fig. 9, three of these are 50 ft. and the other two are 30 ft. Because of the great depth, the hole will have a large diameter. The extra surface mud capacity will take care of the big mud volume in the hole.

Unitized for moving . . . All major equipment on Rig 44, except the 136-ft. standard derrick and its substructure, is unitized onto skids. The draw works and its drive, shown from the rear in Fig. 10, split into two skid-mounted packages. Each of the main mud pumps rides on the same skid with its motor. Of course, each of the three engine-generator sets is a separate package.

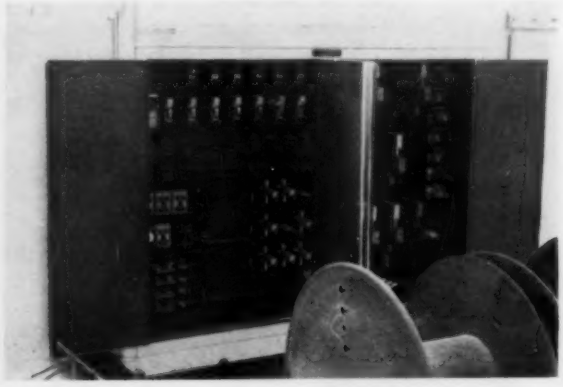
In addition, Rig 44 has an auxiliary D-300 Emsco mud pump skid-mounted with its two 300-hp. diesel engines. There are also two rig-auxiliary skids mounting gas engines driving 35-kw. a.c. generators. Besides its engine-generator, each of these skids has an air compressor and water pump. These auxiliary skids also carry a tool house.

Because of this skid-mounted packaging and because of the flexibility of placing electric equipment, Great Western rigged up quickly on the Montgomery well. Moving from the Odessa yards, 125 miles away from the location, began on a Monday morning. Drilling on the rat hole commenced the following Wednesday at 4:30 p.m. In the future, Great Western expects to be able to move the rig 50 miles and rig up for drilling in as little as 2 days.

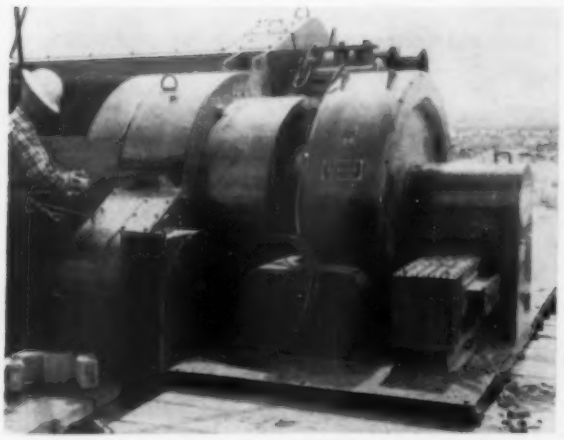
Crews picked and trained . . . Since Rig 44 was to be its first electric rig, Great Western took precautions to see



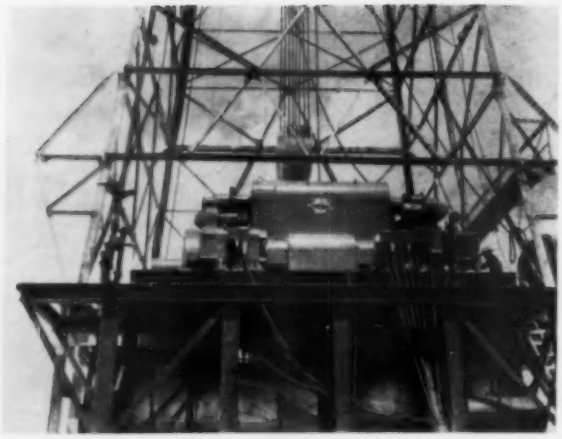
FLEXIBLE COUPLINGS connect each engine to the generator through a friction clutch. Fig. 6.



SWITCH GEAR is contained in utility house which also holds electric cable during moves. Fig. 7.



AUXILIARY BRAKE has magnetic particles which makes it a feedoff controller. Fig. 8.



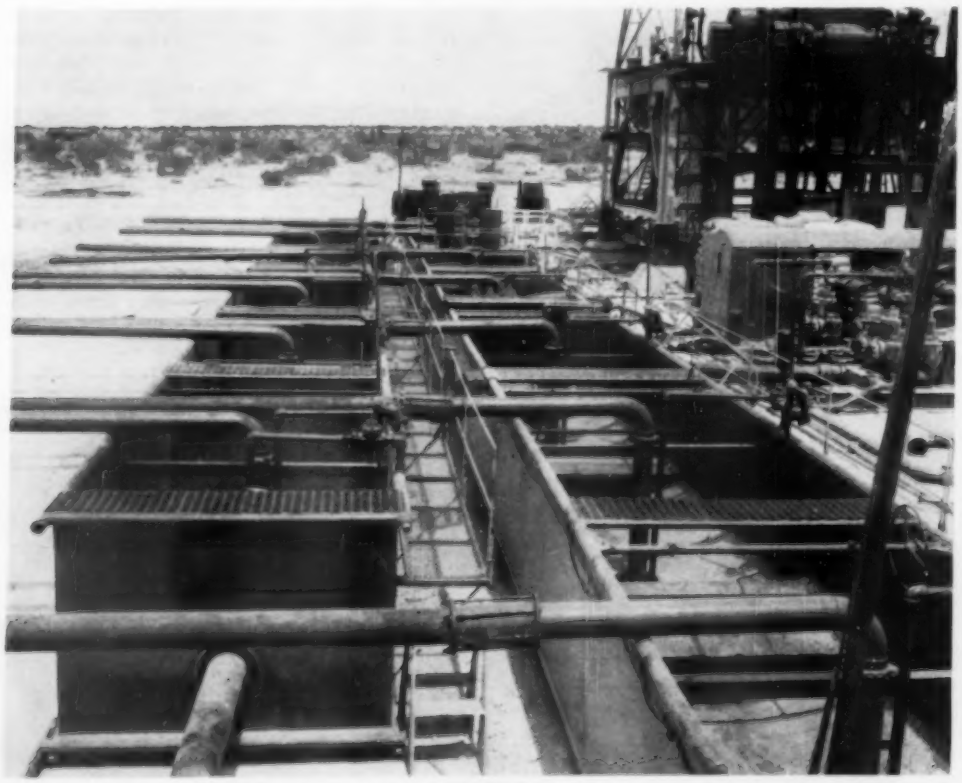
DRAW WORKS AND DRIVE each make a skid package. Such skid mounting speeds up moving time. Fig. 10.

that it was rigged up right and started working smoothly. First step was to make sure all company men concerned were familiar with the new equipment. So, at the start, the company's maintenance superintendent and the tool pusher assigned to the rig went to the factory to learn how the electric equipment is made and assembled.

The next problem was to train the rig crews. Not every motorman and driller wants to leave his power rig, so Great Western didn't assign anyone to the electric rig against his wishes. Instead, the company asked for volunteers. And, many more men asked to work on the rig than there were jobs. As a result, the company picked only those motormen who had already completed its Rig Personnel School (OGJ, Oct. 8, 1956, p. 170).

While the rig was being assembled in the company's Odessa yard, the crews were gathered there to get acquainted with its parts. Representatives of the equipment manufacturers gave lectures on care and use of their particular goods. Company maintenance men and engineers gave lessons on pertinent subjects. Then, the men got the benefit of the first-hand experience of putting the pieces of the rig together.

These measures paid off by getting the rig into operation fast. Moreover, there have been very few time losses to iron out "bugs" since drilling started.



LARGE MUD volume provided by these steel tanks will take care of the volume of the deep hole. Fig. 9.

"Package" Concept Cuts Expansion Cost

When Vickers recently upped its T.C.C. capacity by 50 per cent, it kept the costs of the expansion moderate and suffered little loss of operating revenue since most of the work could be done with the unit on stream.

By T. Ben Arnold and Stephen Valentine

THE MODERN cat cracker is not built with a zipper. Expansion of capacity and throughput cannot be obtained by letting out a little in the uncomfortable places. Any major expansion of given refining facilities is normally accomplished only after a good deal of planning, time, and expense.

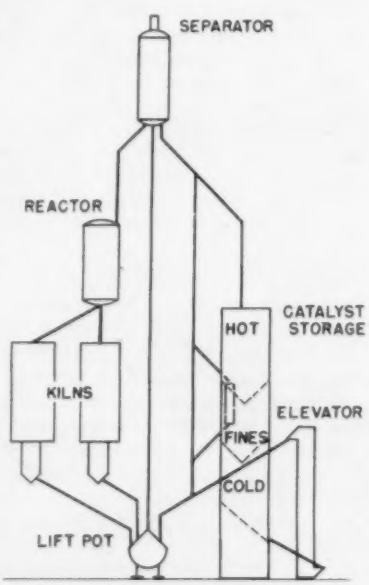
However, expansion of the unit much past its inherent maximum capacity presents many problems aside from sparing condensers, paralleling lines, or increasing pump-impeller diameters. Unit down time is of paramount importance, for a prolonged shutdown is indeed costly.

The refiner has to decide if his expansion program could best be done during an extended turnaround, working around the clock, or whether some logical sequence may be followed in stretching the expansion program through two or three scheduled turnarounds. If the latter plan is followed, it may be 1½ to 2 years before the expansion program is completed.

Manpower must be considered. Refinery maintenance forces might carry the work of expansion if the program was sufficiently stretched. Even then, it is possible that additional manpower would be required. If all work was to be done during an extended turnaround, outside contracted assistance would be necessary, and this assistance would command premium pay. Then, too, the plot plan may limit the space available for new equipment and increased maintenance may be the result of a newly created congested area. These and other factors influence the refiner's decisions.

Vickers Petroleum Co. recently increased the capacity of its package T.C.C. 50 per cent in Potwin, Kans. This is a sizable expansion. The increase was obtained by adding a third kiln to the cat cracker and revising the catalyst and oil-circulation systems where required. The time between preliminary engineering studies and completion of the required construction was less than 1 year. Unit down time did not extend past the scheduled turnaround periods. The total cost of this expansion was about 10 per cent of the initial investment cost of the complete T.C.C. (catalyst and oil side) installation.

Prior to the installation of the cat unit and its allied feed-preparation, fractionation, and gas-plant equipment, Vickers had a 5,000-6,000-bbl per day crude run with thermal cracking and reforming facilities plus a small cat poly unit. At the time the T.C.C. was installed, the crude unit was modified for a crude run of 10,000 bbl. per day. The cracker was to process 4,000 bbl. per day of fresh feed at a 0.6 recycle ratio for a total reactor charge of 6,400 bbl. per day. Kiln capacity was rated at 3,400 lb. of carbon per hour. The unit was to produce 2,200 bbl. per day of T.C.C. debutanized gasoline. The cracking was to be done by circulation of 165 tons per hour of catalyst.



ARRANGEMENT of catalyst section prior to modification. Fig. 1.

Package T.C.C. . . . The cat unit selected was of the original package T.C.C. design. The term "package" T.C.C. means exactly that—**all** new process vessels in the plant were shop fabricated. This included the T.C.C. reactor and kilns and also the syn tower and tar separator used in connection with the T.C.C. unit. This meant considerable savings when compared with field fabrication and erection costs of the same vessels.

The T.C.C. unit was mounted in a derrick structure which made it possible to install the vessels without rigging equipment.

Fig. 1 shows schematically the arrangement of the T.C.C. vessels in the structure. Catalyst gravitates in compact flow from the top to the bottom of the unit. Circulation rates are governed by the rate of catalyst withdrawal at the low point in the system. Catalyst is fed from the highest point in the system, the separator, to the 11-ft. 5-in.-diameter reactor by a seal leg which seals against reactor pressure.

In the reactor, the catalyst is contacted by oil vapors and liquid feed from the feed-prep system and cracking takes place in concurrent flow with the catalyst. The cracked vapors are disengaged from the catalyst at the base of the reactor and flow to the fractionation system.

Catalyst gravitates into two identical 12-ft.-diameter kilns, where combustion of the coke on the catalyst takes place under controlled conditions. The regenerated catalyst then passes through the tubes of a vertical tube-in-shell catalyst cooler at the base of each kiln, where the temperature of the catalyst is reduced by steam generation. The catalyst from each cooler then flows to the lift pot, where it is pushed into an upward moving air stream at controlled rates, and is elevated to the separator to again re-

Authors are with Vickers Petroleum Co., at Potwin, Kans., and Socony Mobil Oil Co., Inc., at New York, respectively. Paper presented at the regional meeting of W.P.R.A., Wichita, Kans.

sume its downward flow cycle. Lift and combustion-air quanities are supplied from a combination blower.

Cat storage . . . Of particular interest to this discussion is the catalyst makeup, elutriation, and storage system. Three catalyst-storage bins are provided. One is for storage of fresh catalyst used as makeup in the system, another is for storage of catalyst fines removed by elutriation, and the third holds the entire unit inventory of hot catalyst during turnarounds. These three bins are in one 12-ft.-diameter, shop-fabricated vessel, one above the other as shown on Fig. 1. The elutriator is within the fines bin which also acts as a settling chamber for catalyst fines. As shown in schematic plan (Fig. 2), this storage vessel is within the structure in the quadrant diagonally opposite the reactor.

The Vickers unit was put on stream in February 1953, and has operated smoothly since then. The initial investment cost of the complete installation —feed prep, T.C.C., fractionation, and gas plant—was about 2.1 million dollars, of which about one-third was for the T.C.C. unit only.

Expansion . . . Since startup, the capacity of the Vickers' T.C.C. was gradually increased through normal refinements and advances in technical and operating knowledge. By September 1955, the refinery crude run had been increased to over 13,000 bbl. per day of which about 6,000 bbl. per day was charged to the T.C.C. as fresh feed. Total reactor charge was about 7,500 bbl. per day or 17 per cent over original design. The coke laydown had been increased to 4,500 lb. of carbon per hour on 190-ton per hour cat circulation, or a coke-burning increase of about 32 per cent. Debutanized T.C.C. gasoline production had increased 22 per cent to over 2,700 bbl. per day. Percentage increase in coke was almost in direct proportion to the increased crude run.

At that time it appeared that 4,500 lb. per hour was the maximum coke loading for the kilns, or about 2,250 lb. per hour per kiln. However, the reactor with three levels of disengaging channels, had a capacity of 10,000 bbl. per day total feed. Additional feed could be charged to the reactor up to this limit, if additional catalyst circulation and carbon-burning capacity could be obtained. Studies indicated that this was feasible if an additional kiln could be installed paralleling the existing kilns, and if catalyst circulation could be increased to about 290 tons per hour.

The proximity of the existing catalyst-storage vessel to the reactor and lift pot, coupled with the fact that its shell diameter was identical with the existing kilns, made that vessel the target of a detailed investigation to see if it could be modified into a third kiln. If this vessel was used for a third kiln, a new hot-catalyst storage bin would be required.

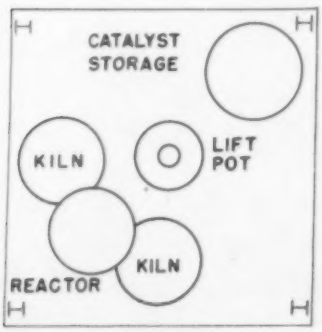
Making changes . . . Sufficient space for a new hot-catalyst storage vessel was available between the structure and the control room to the south as shown on Fig. 3. This bin would have to be quite tall so that catalyst could gravitate back to the lift pot to minimize catalyst transfer time. But, if the vessel was skirt supported, the volume beneath the bottom head of the hot bin could be used for additional fresh-catalyst storage.

The studies indicated that a full-size kiln and cooler could be installed within the shell of the existing catalyst-storage vessel. The elutriator would require relocation and a temporary fines bin had to be provided. The top head of the fresh bin (which was the bottom head of the fines bin) would require some modification, but the available volume for catalyst storage in the fresh bin would be decreased only slightly. The volume existing above the fresh bin would be available for modification into the third kiln, if a new hot bin was erected and tied into the catalyst system. Work could then proceed while the T.C.C. remained on stream.

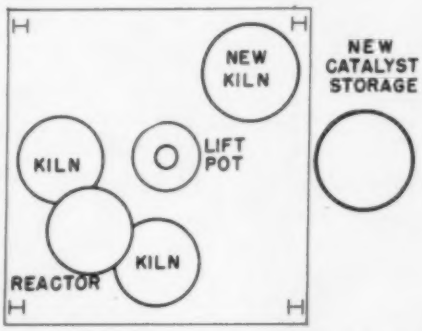
Design work followed three concurrent lines—details of the new kiln and its auxiliary equipment, required modifications to the existing catalyst circulation system, and necessary debottlenecking of the oil side.

Erection . . . After the new hot bin was erected, and tie-ins made during a scheduled turnaround, some work was required to prepare the existing hot bin for its transformation into the third kiln. The top head was removed, inner cones cut away, and a large opening was cut through the shell and suitably reinforced to provide access to the new cooler. The cone bottom of the old hot bin was relocated to form the bottom head of the new kiln. After the internal insulation was applied and the necessary support brackets hung, assembly of the kiln internals was commenced from the bottom up, by lowering the various components in from above.

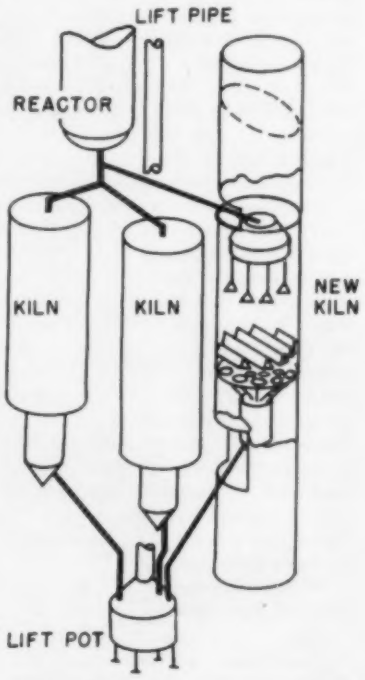
Fig. 4 shows the relationship not only of the new kiln to the existing kilns, reactor, and lift pot, but indicates the assembly of kiln internals. The catalyst drawoff plate was first installed, access being provided beneath the plate for installation of the drawoff pipes. The flue-gas collector pipes were attached to the drawoff plate, and the flue-gas disengaging channels suspended over the pipes from their support brackets. The com-



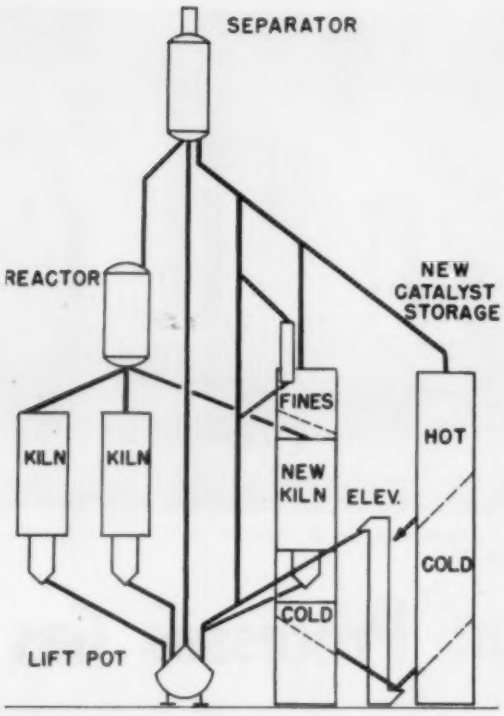
PLAN of catalyst section prior to modification. Fig. 2.



LOCATION of new catalyst storage vessel. Fig. 3.



ARRANGEMENT of new kiln within structure. Fig. 4.



MODIFIED arrangement of catalyst section. Fig. 5.

pletely fabricated catalyst and air distributor assembly was then lowered into place, followed by the top head of the kiln. This completed the assembly of the kiln internals.

New blower . . . A new turbine-driven combustion air blower was installed adjacent to the existing combination blower to utilize existing surface condenser equipment. This blower was piped directly to the new kiln without an air line burner. A 24-in.-diameter combination flue-gas stack was installed with connections from the top and bottom plenum chambers of the kiln. A new catalyst cooler was shop fabricated and hung in place beneath the kiln.

All of this work, hot bin, kiln, kiln auxiliaries, plus the installation of a new gas compressor was done by refinery maintenance forces augmented only by two welders who were expressly hired for the expansion program. No additional down time had been required as the catalyst-circulation system tie-ins to the new hot bin were made during a scheduled turnaround.

Modifications . . . As mentioned previously, certain parts of the catalyst and oil-circulation systems required modification to accommodate the increased catalyst and oil rates. On the catalyst side, the reactor seal leg was the only line that needed to be replaced by one of larger diameter. All other catalyst lines, lift pipe, and catalyst valves were adequate for the increased circulation. Of course, some new catalyst piping was required—a line had to be run between the reactor catalyst outlet and the new kiln, and piping between the new cooler and the lift pot, including catalyst meter box and lift seal leg, was needed. Some modifications to the lift pot were necessary to accommodate the latter. Fig. 5 illustrates these revisions to the catalyst-circulation system, and shows schematically the modified arrangement of the unit.

These cat side modifications could only be made while the unit was down. However, practically all of the new pipe sections—seal leg, meter box, piping from reactor to kiln—could be shop fabricated. Actual field work at shutdown was limited to revising the lift pot and modifying certain sections of the catalyst elutriation and makeup system. Tie-ins, aside from installation of the shop fabricated piping, were made between the new cooler and the steam drum on the thermosyphon system, and a cooling air connection to the bottom kiln plenum was made from the existing cooling-air fan for control of bottom stack temperatures.

Oil-side revisions . . . Aside from the tie-in of the new compressor, oil-side revisions included installation of a new intermediate reflux system for the syn tower and additional syn-tower overhead condenser surface. While the latter was not directly applicable to the expansion program, both modifications have appreciably reduced the pressure drop in the fractionation system. No modifications were made to the feed-prep section.

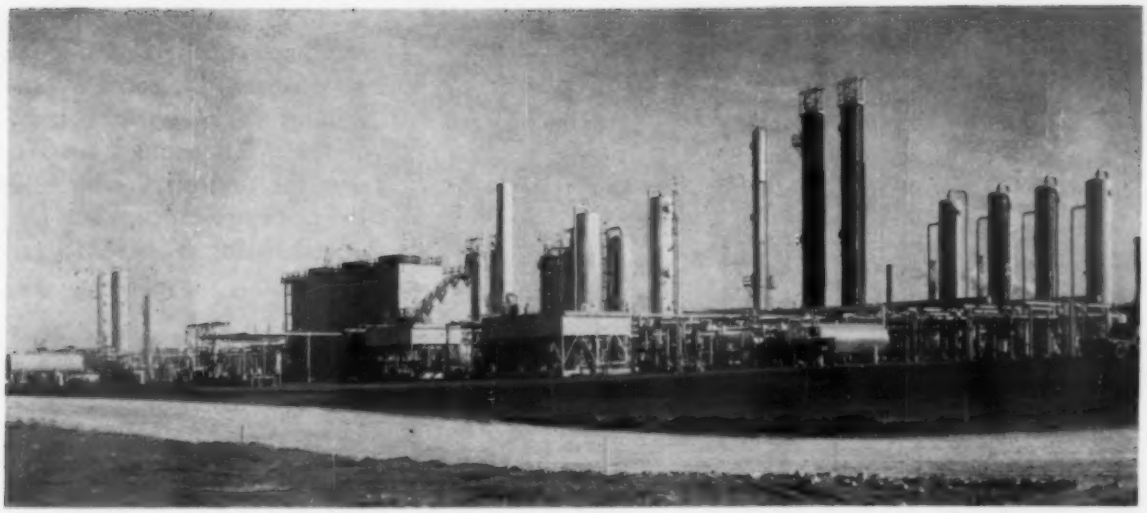
"This sizable expansion was accomplished at moderate cost and little loss of operating revenue since most of the work could be done with the unit on stream . . . The package concept was the salient factor in preventing a prolonged shutdown."

The turnaround for final tie-ins occurred last November. This was a normally scheduled turnaround, and all tie-in work was accomplished within the scheduled period. Following this, Vickers brought the revised unit back on stream, again with no operational difficulties. Catalyst circulation has reached 300 tons per hour and all components have functioned satisfactorily.

Some further work is required in the feed-prep section as the main charge furnace currently limits the recycle rate to the reactor. This bottleneck will be eliminated either by the use of additional exchangers or by installation of a small recycle heater.

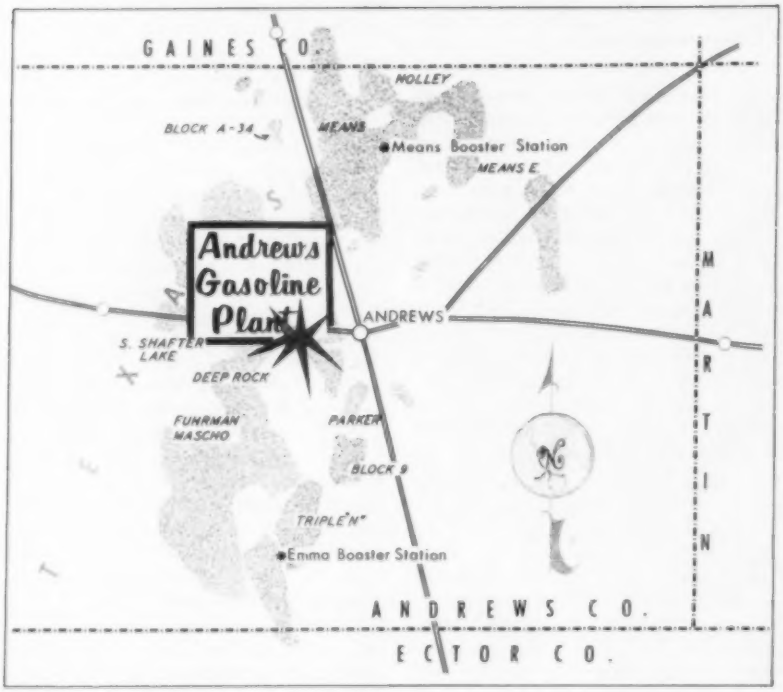
With its expanded unit Vickers will have the capacity to charge over 7,000 bbl. per day of fresh feed (10,000 bbl. per day total feed with 1,200-2,000 bbl. per day liquid) to the reactor. This is an increase in fresh feed of 75 per cent over the original design. From this charge, it can expect to produce 3,200-3,500 bbl. per day of debutanized T.C.C. gasoline, up to 60 per cent more gasoline than design; 30 per cent more than operations prior to the modification. Rated coke-burning capacity is now 6,750 lb. of carbon per hour or 50 per cent over recent operations. Current coke-burning capacity is 100 per cent greater than original design.

This sizable expansion was accomplished at moderate cost and little loss of operating revenue since most of the work could be done with the unit on stream. The package concept of the Vickers T.C.C. was the salient factor in prevention of a prolonged shutdown or series of shutdowns that otherwise would have been required for a cat cracker expansion of such size. **End.**



ABSORBERS, a reabsorber, low and high-pressure stills, and a deethanizer are all employed in the Andrews gasoline plant. MEA treater brings residue gas to less than 0.5 grains H_2S per 100 cu. ft.

New Gasoline Plant Processes Gas



GAS is gathered to Means and Emma booster stations for the plant.

From 14 Texas Pools

. . . with producing area of 98,000 acres

By R. J. Brosamer and C. G. Eaheart

Phillips Petroleum Co.

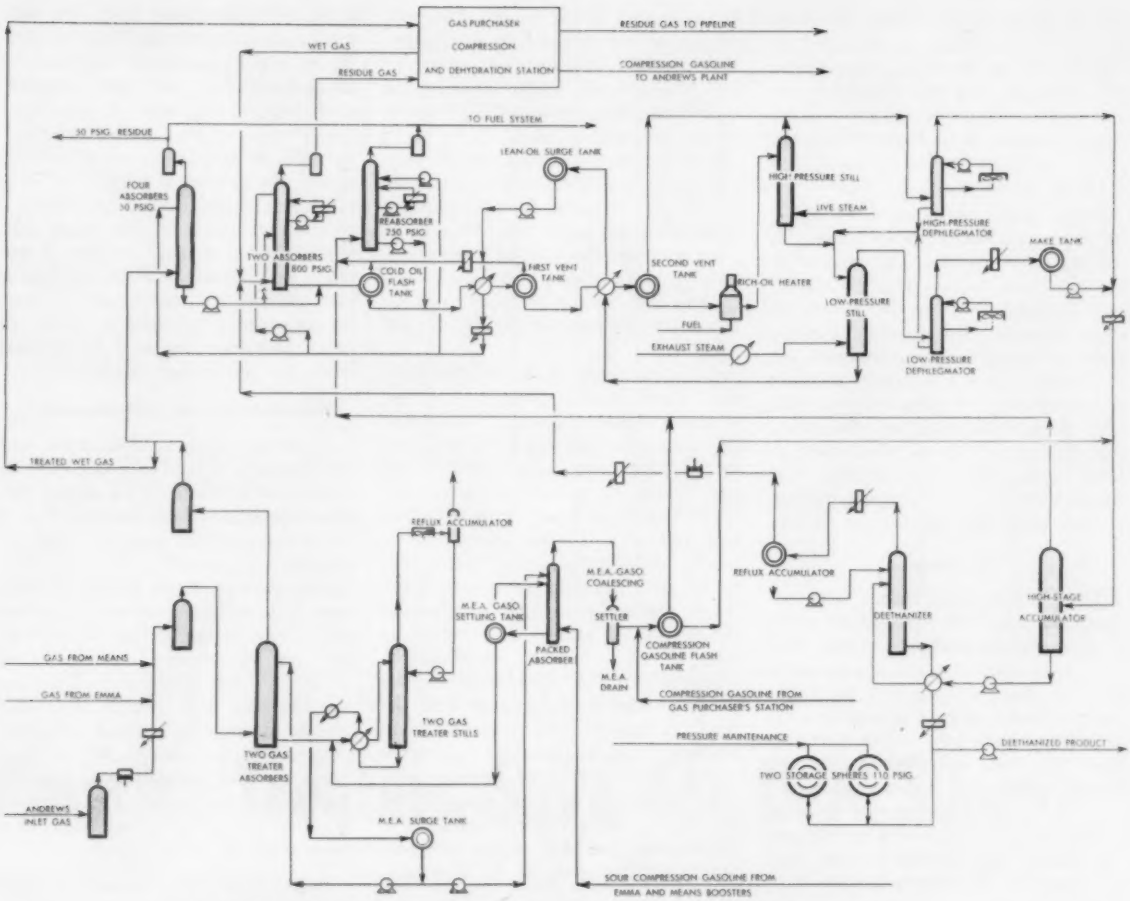
THE central portion of Andrews County, Texas, has been the site of a successful exploratory drilling program. The development of the area has been fast and prolific, and geologists and reservoir engineers consider it one of the most promising new areas in the Permian basin from the standpoint of crude and natural-gas reserves.

In September 1956, Phillips Petroleum Co. began operation of its Andrews gasoline plant. The plant, located 3 miles west of Andrews, Tex., in the center of the vast oil-producing area, gathers and processes gas from 14 pools having an approximate producing area of 98,000 acres. This area has extensive proved reserves of oil and gas from eight producing formations.

The increasing number of discoveries, coupled with renewed drilling activity and fracture treating in the older pools, resulted in a continually changing design of the gas-gathering system. The final gathering-system design required installation of two booster stations to serve all the leases under contract.

To the north of the plant, Means booster station gathers gas from the Means, East Means, Block A-34, McFarland, Nolley, and Magutex pools and discharges the gas to Andrews plant. Emma, Triple "N," and a portion of Fuhrman-Mascho pools to the south of the plant are served by Emma booster station.

The compression facilities at Andrews plant handle gas gathered from



PLANT DESIGN was based on handling an average gas volume of 80 M.M.c.f.d.

Andrews, Deep Rock, Parker, South Shafter Lake, and University Block 9 pools and that portion of Fuhrman-Mascho gas not gathered through Emma booster station. The eight formations producing in the area covered by the gathering system are the Ellenburger, San Andres, Pennsylvanian, Wolfcamp, Devonian, Queen, Glorieta, and Fusselman.

Gas Gathering and Compression

Means booster station . . . This station receives gas from the north end of the field at 5 psig. suction pressure and, after two-stage compression, discharges the gas at 86 psig. to Andrews plant. The station, located 10 miles north of the plant, is of conventional design; engine water, lube oil, and gas cooling is by air-fin units. Electric power is purchased and all prime movers are electric motors. Engine water pumps and air-fin fan drives are equipped with time-delay switches to insure operation after momentary power failure.

An engine foreman, resident engine operator, and roustabout run the station. Housing is provided adjacent to the station site for all booster-station personnel. For convenience of operation by a limited number of personnel, the station was designed for semiautomatic operation. Alarms are used to warn the operator of high engine temperatures, liquid levels in scrubbers, low instrument air pressure, and low gas-discharge pressure. The engine water-cooling air-fin fan drives are equipped with automatic stop-and-start temperature switches.

Emma booster station . . . This station is located 12 miles to the south of the plant. After two-stage compression from 5 psig. suction pressure, the booster discharges the gas at 135 psig. to the plant. The booster station is manned by a resident operator, and housing is provided at the station site. Hydraulic motors, instead of electric prime movers, have been provided for motivating auxiliary equipment to preclude station shutdown due to temporary electric-power failure.

The hydraulic pumps for the systems are connected directly to compressor-engine flywheel shafts and supply power for hydraulic motors driving the air-fin fans serving each individual compressor unit. In keeping with design for unattended operation, the engine cooling-water circulating pumps are belt driven from the engine flywheels. Where applicable, the alarm system is the same as that used at Means booster station.

Wet gas enters the compressors at Andrews plant at 5 psig. suction pressure and is discharged at 50 psig. to atmospheric cooling coils. The cooled gas is commingled with gas entering the plant from the booster stations. The compression facilities are of conventional design with the exception of two units which are equipped with ebullient cooling. Ebullient cooling was installed on these units to evaluate the merits of this system as compared to conventional cooling. Housing for the plant supervisory personnel is provided adjacent to the plant site.

The gas-gathering system serving the compression facilities was designed to receive gas from traps and to deliver it to the compressors at a

suction pressure of 5 psig. A lease residue return system is provided to supply fuel to leases in areas where it is required at a minimum pressure of 15 psig. The gathering and residue return systems contain approximately 280 miles of pipe varying in size from 2 to 24 in.

Plant design was based on treating and processing an average gas volume of 80 M.M.s.c.f.d. with a 10 per cent load factor. The gas treater was designed to treat the gas at 50 psig. through two parallel treating units. Oil absorbers were designed for a residue pipeline-delivery pressure which will vary between 500 and 800 psig. A two-still type of distillation unit having a lean-oil circulation of 1,200 thousand gallons per day was selected as the most practical method of recovering the natural gas liquids.

Gas Treater

The 50-psig. gas treater was designed to treat the raw gas to a hydrogen sulfide content of less than 0.4 grains per 100 cu. ft. in order that the plant residue gas return to the purchaser, after hydrocarbon extraction, would have a content less than 0.5 grains per 100 cu. ft. The treater design was based on the average inlet gas having approximately 1,450 grains of hydrogen sulfide per 100 cu. ft. and having a total acid gas content of approximately 3.75 mole per cent. Since the plant inlet gas in obtained from eight formations and 14 pools, the acid-gas content from a formation and area may vary from 1 to 12 mole per cent; therefore, the treater solution circulation is designed for 2.9 cu. ft. acid gas removal per gallon of circulation.

The gas-treater circulation rate is 400 g.p.m. of 20 per cent monoethanolamine solution through each of two independent treating units. Exhaust steam at 285° F. is supplied to the kettle elements of the stripping stills. Still operating pressures are held to a minimum to decrease breakdown of the amine solution due to high temperature degradation.

Treated gas was delivered at 40 psig. minimum pressure to the gas purchaser's station for compression, and it is returned at a maximum pressure of 800 psig. for processing. The wet gas is contacted with lean absorption oil in absorbers at this pressure, and the residue gas is returned to the purchaser for dehydration and pipeline delivery.

Rich oil from the absorbers, which have oil-intercooling facilities, flows through heat exchangers and vent tanks to a direct fired preheater where it is heated to 420° F. The oil from the preheater is fed to the 250-psig. still for partial stripping by live steam. The partially denuded oil passes to the 50-psig. still where stripping is completed using plant exhaust steam as the stripping medium.

The denuded oil from the 50-psig. still passes countercurrent to the rich-oil stream through heat exchangers to the lean-oil surge tank. The oil is pumped from the lean-oil surge tank through final heat exchangers and cooling coils to the absorbers and reabsorbers, thus completing the oil cycle.

Gasoline vapors from the 250-psig. still, after passing through a water refluxed dephlegmator, are condensed in atmospheric cooling coils and pass to the high-stage accumulator which also serves as the fractionator feed tank. Vapors stripped in the 50-psig. still follow a similar cycle into a totally condensing make tank from which they are pumped to the high-stage accumulator. Raw gasoline in the high-stage accumulator serves as feed to the 500-psig. deethanizing fractionator. The deethanized kettle product, after heat exchange with the feed, is cooled and transferred to Phillips' natural-gasoline gathering system. Two 6,000-bbl. spheres provide surge and storage capacity for the feed to the gathering system. The fractionator overhead vapors are compressed and returned to the absorbers.

Reabsorbers . . . Vapors from the high-stage accumulator, compression gasoline flash tank, and vent tanks pass to the 250-psig. reabsorber where they are contacted with lean oil. Rich oil from the reabsorber is pumped into the oil stream from the absorbers for processing. The reabsorber is also equipped with oil-intercooling facilities. The reabsorber residue gas supplies the plant, booster station, and lease-fuel requirements.

The gasoline obtained from compression is transferred via pipeline to the plant. The gasoline from the gas-purchaser's station is sweet and passes directly to the compression gasoline flash tank. The gasoline from the two booster stations is sour and is treated in a packed column with a side stream of amine from one of the main gas-treating units before entering the flash tank. Gasoline from the flash tank is pressured into the high-stage accumulator.

Vertical atmospheric coils located in a three-cell induced-draft cooling tower are used for the distillation-unit cooling. The cooling water required for the closed coolers in the gas-treater units is cooled in a natural-draft tower.

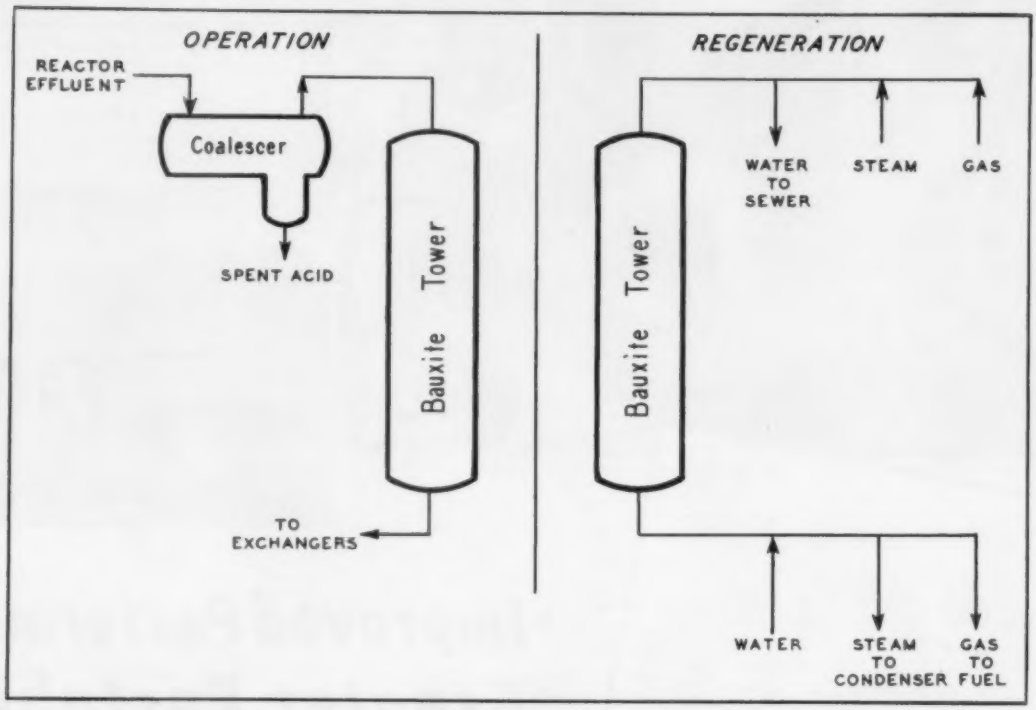
Electric power for the plant and boosters is purchased from the electric power company serving the area. Steam requirements are supplied by three 50,000 lb. per hour induced-draft boilers. The high exhaust-steam requirement of the gas treater made possible the maximum use of turbine drives. Plant water is supplied by four 100-g.p.m. wells located approximately 9 miles north of the plant site. Water for the booster stations is supplied by individual wells located at each station site. As previously mentioned, residue gas fuel for both the plant and the boosters is supplied from the reabsorber residue.

Measurement and Instrumentation

A console type of instrument control board is housed in a centrally located control room. This board contains miniature forced-balance type of instruments for the control of the distillation, fractionation, and gas-treating equipment. Panel boards with the same type of instruments are used for the control of the boilers, water treaters, and compressors and are located adjacent to the equipment. The plant was designed with audible and visual alarms to indicate various maloperations which may occur. Where chart integration for accounting is required, flow meters with standard 12-in. charts are used and are mounted adjacent to the companion meter runs.

Safety precautions have been taken to protect installations against the occurrence of fire and explosions, and explosionproof motors have been used throughout the plant. Manual and automatic electric shutdown systems are provided for the compressors, rich oil preheater, and boilers. In the event of a casualty this equipment can be shut down individually or collectively. Water lines for the fire-fighting system are routed to cover the plant area adequately. Two fire pumps, one steam turbine driven and the other driven with a gasoline engine, are installed in the plant. Normal portable fire equipment is provided in the plant and at the booster stations. A fire-fighting training area is provided to train personnel in the proper methods of extinguishing various types of fires. Such safety features as insulation of hot process lines and vessels for personnel protection, ladders with cages, platforms, etc., have been provided.

Design and construction . . . The process design and the purchase of equipment for the plant and booster stations were done by personnel of Phillips Petroleum Co. The mechanical design and construction of the facilities were contracted to Gasoline Plants Construction Corp., Houston, Tex.



BAUXITE TREATING consists essentially of a coalescer and two bauxite contacting beds. Fig. 1.

Bauxite Treaters Save for D-X Sunray

$175 per day in maintenance and down time

$ 50 per day in neutralizing and inhibiting costs

$ 33 per day in acid catalyst

$600 in TEL savings when alkylate is used in motor fuel

By V. L. Brant

THERE has been considerable interest in the use of bauxite filters in sulfuric acid alkylation plants.

- Bauxite filters are being used to replace caustic washing facilities in existing plants and as standard equipment in new installations.
- Their function is to remove acidic and sulfur bearing materials from the liquid alkylation reactor effluent. These materials cause corrosion and fouling in the fracturing system and loss in tetraethyl lead susceptibility in the alkylate product.
- This paper describes D-X Sunray's experience in the use of bauxite treaters.

Author is with D-X Sunray Oil Co., Tulsa. Paper presented at W.P.R.A. meeting, Wichita, Kans.

D-X Sunray's experience can be summarized as follows:

1. We have successfully used the bauxite treating system for 2½ years.
2. We have reduced our maintenance and down-time costs 85 per cent for a savings of $175 per day.
3. We have reduced neutralizing and inhibiting costs $50 per day.
4. We have reduced the water content of the recycle isobutane, resulting in a savings of approximately $33 per day in acid catalyst.
5. By improving the lead susceptibility of the alkylate we realize up to $600 or $700 per day in tetraethyl lead savings, when the alkylate is used in a motor blend.

The total savings to us amounts to $258 per day in operating and maintenance costs plus an additional $600 to $700 per day when the total alkylate is used in a motor blend. This may not be typical of all refineries, since the figures were based on our situation where we were operating at 300 per cent of design capacity. This, we are sure, increased our fouling and corrosion problems above that which would be normally expected. However, we do feel that it would not be feasible to operate at our present throughput without the bauxite filters.

This process is licensed by M. W. Kellogg Co.

Alky Plant History

In order fully to appreciate what the filters have done for us, it will be necessary to describe the fouling

This Wheland HP-8000 handles above average pressures for slim hole operations, yet is easily portable according to Mr. Harold Black, Owner (right). At left is Mr. W. E. Riley, Pusher.

Here is Black Drilling Co.'s streamlined unit, which was designed around their efficient HP-8000 Wheland Pump.

P. O. Box 506

Phone 75

Black Drilling Company

ALBANY, TEXAS

June 8, 1957

Mr. Gordon P. Street, President
The Wheland Company
Chattanooga, Tennessee

Dear Mr. Street:

The HP 8000 Wheland Pump, which we put in service in January, is more than meeting our specifications. We required a pump that would handle above average pressures for our slim hole operations and yet adapt itself to our plan of streamlining and portability. Our streamlined unit, which was designed around your pump, has cut our moving and rig-up time by 50% and increased our bit footage and penetration rates by 20%.

The performance of this pump and your field service has more than justified our choice of a Wheland.

Very truly yours,

BLACK DRILLING COMPANY

Harold Black

Harold Black

•Improved Performance
•Greater Portability

WHELAND

HP-8000 DUPLEX SLUSH PUMP
7-¼" x 12", 220 HP Nominal Input at 70 RPM

"cut our moving and rig-up time by 50% . . . increased our bit footage and penetration rates by 20%"

—Mr. Harold Black, Owner

The biggest little pump on the market!

Wheland builds a complete Line of Efficient Slush Pumps designed to give you Dependable Operation, Lower Maintenance. Write for Detailed Bulletins.

WHELAND

ROTARY DRILLING MACHINERY

THE WHELAND COMPANY

CHATTANOOGA, TENNESSEE, U.S.A.

DRAW WORKS • SLUSH PUMPS • ROTARIES

CROWN BLOCKS • TRAVELING BLOCKS • SWIVELS

DOMESTIC DISTRIBUTORS: INDUSTRIAL SUPPLY COMPANY, INC.—Main Office: Wichita Falls, Texas • HOUSTON OIL FIELD MATERIAL COMPANY, INC.—Main Office: Houston, Texas • JONES AND LAUGHLIN STEEL CORPORATION, SUPPLY DIVISION—Main Office: Drawer 2481, Tulsa 2, Oklahoma.

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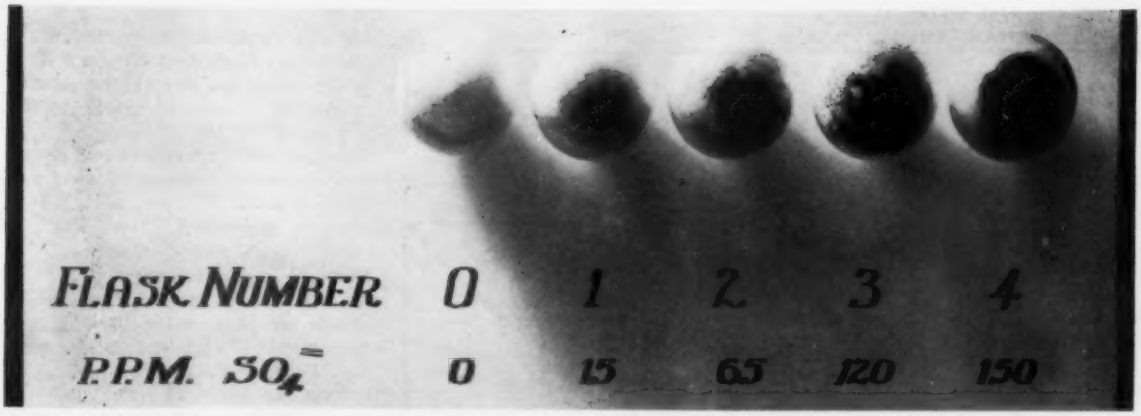


BAUXITE TREATING results in improvement. Flasks 3 and 4 are typical of untreated alky reactor effluent, Flask 2 is typical of residue from caustic washed effluent. Flask 0 showing no deposit is for bauxite-treated effluent. Flask 1 is control point at which filters are switched. Fig. 2.

and corrosion history of our plant. D-X Sunray put its first sulfuric acid alkylation plant on stream in the fall of 1950. This plant contained a Kellogg cascade two-stage reactor with a design capacity of 800 bbl. per day of total alkylate. The liquid reactor effluent consisted of a deisobutanizer, debutanizer, and rerun tower. We have revamped the plant in several stages and presently have a three-stage reactor and manufacture 3,000 bbl. per day of total alkylate. The fractionating system is the same with the exception of revamped internals in some of the towers and additions of heat exchange.

Fouling . . . The problem of fouling was intensified with increased throughput. Immediately after startup of the plant in 1950, it became apparent that we would have serious fouling and corrosion in the rerun tower. As we increased production to about 1,800 bbl. per day of total alkylate this condition became so severe that the rerun tower was down every 6 to 10 days to clean the tube bundle in the reboiler and frequently to replace the risers, caps, and frogs in the tower proper. This condition became intolerable even with the best inhibitor system we could devise.

We finally changed over to open steam in the fractionator and took the reboiler out of service. This resulted in the tower remaining on stream longer, but at a sacrifice of fractionation efficiency, resulting in loss of light-alkylate yield. From the beginning, we had some fouling upstream of the rerun tower, but it was of a much less severe nature and could be tolerated.

Deisobutanizer fouling . . . However, as we increased production to about 2,200 bbl. per day of total alkylate this also became intolerable. The deisobutanizer, which is the heart of any alkylation plant, was fouling severely. We were getting from 2 to 4-week runs before the purity of the overhead stream was dropping enough to force shutdown for cleaning this tower. We would chemically clean the tower and open and inspect. Frequently we had to remove the trays for mechanical cleaning.

Lab work . . . Our laboratories had been actively studying the problem throughout this period. Their initial work centered around secondary measures, such as inhibitors and emulsifiers to aid in control of the problem. These measures gave some relief but they became inadequate as throughput increased. The laboratories then became active in developing a means of removing the corrosive and fouling constituents from the liquid effluent. Obviously the caustic wash system was not removing all the corrosive constituents from the alkylate.

Investigation revealed that caustic washing was removing the acid and acid esters. However, some neutral sulfur bearing esters remained in the hydrocarbon. Some of these neutral esters were later decomposed in the fractionation system, leaving a carbonaceous deposit and causing an acid condition.

Why fouling? . . . Other more stable neutral esters survived the temperatures of the fractionating system and appeared in the alkylate product, causing loss in tetraethyl lead susceptibility. Also, it was found that the fouling tendency of the alkylate was, in most cases, increased by caustic washing due to the solubility and entrainment of sodium compounds. After much investigation and many pilot-plant tests, bauxite treating was found to be the answer.

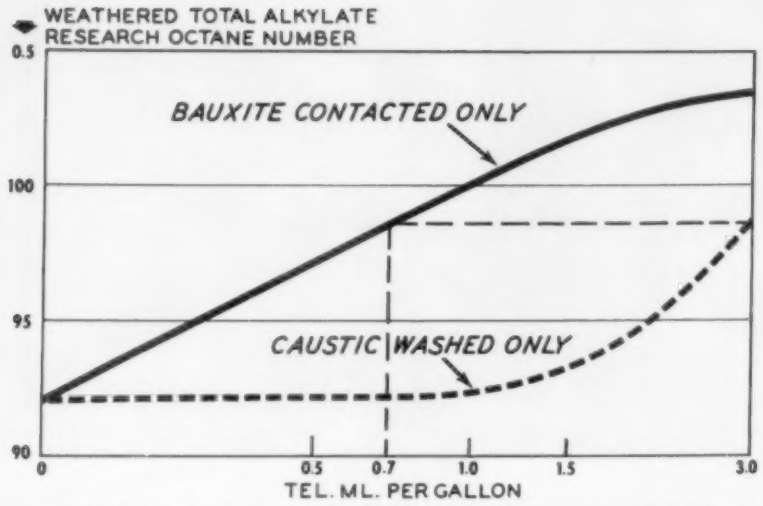
Bauxite Treating System

The treating system consists essentially of a coalescer and two bauxite contacting beds as shown in Fig. 1. They are located in the liquid effluent system immediately following the reactor, and before heat exchange with the recycle and fresh feed. This location provides protection for the exchangers as well as the fractionating system.

The liquid effluent passes first through a glass-wool coalescer which separates the finely suspended particles of acid from the hydrocarbon. The operation removes about 75 per cent of the insoluble acid. Next, the liquid flows down through one of the bauxite treaters where the remaining soluble and insoluble acids and other sulfur bearing materials are removed. The hydrocarbon leaving the treaters is essentially free of all corrosive and fouling constituents.

Operation . . . The treaters are operated alternately, one on stream while the other is being regenerated. The on-stream life varies from 3,000 to 6,000 bbl. of reactor effluent per ton of bauxite, depending upon the quantity of sulfur bearing materials to be removed. The regeneration cycle consists of water and steam desorption of the sulfur bearing materials, followed by natural-gas drying of the bauxite. The bauxite is regenerated in place and can be used repeatedly. Bauxite is added to the filters only as necessary to replace losses during the regeneration cycle. The alkylate leaving the filter is not treated further, and the preexisting caustic wash system remains only as a wide space in the line.

Bauxite treating effective . . . Fig. 2 is a visual gage of the effectiveness of bauxite treating. The picture shows



TEL RESPONSE of bauxite-treated alkylate is better than of the caustic-washed material. Fig. 3.

the deposits left in a 100-ml. distillation flask after boiling 100 cc. of weathered reactor effluent to dryness. Flasks 3 and 4 are typical of untreated reactor effluent. Flask 2 is typical of the residue that is left in the flask from caustic washed effluent. Flask 0 showing no deposit is typical of a bauxite-treated reactor effluent. Flask 1 is the control point at which we switch filters.

The effluent from the bauxite treaters will have an 0 flask rate for nearly the complete cycle. The transition from 0 to 1 flask rating takes place over less than 25 per cent of the on-stream period.

Preferential adsorption . . . The mechanism of the filters is one of preferential adsorption. At the beginning of the cycle the bauxite adsorbs sulfuric acid, acid esters, and neutral esters. As the bed becomes loaded with these sulfur bearing materials, it will start desorbing the neutral esters. It is at this point that the flask will begin to show deposit.

These, I repeat, are neutral esters and do not show any acidity by normal titration methods.

The beds have a large capacity for acid and acid esters. We have, as a matter of fact, purposely left a filter on stream for as long as 10,000 bbl. per ton of bauxite without any show of acid in the treated product. Below the flasks in Fig. 2 you will note the approximate parts per million of sulfate represented by the deposits.

Sulfur determination . . . I might caution here that ordinary sulfur determination methods are not sensitive enough for this test. We used an alcoholic potassium hydroxide digestion method, followed by quantitative sulfate determination. A typical charge sample would vary upward of 120 p.p.m. The flask representative of the onstream period shows no sulfate. Over the last 25 per cent of the cycle, it gradually increased to 15 p.p.m. These tests clearly show the relative corrosion and fouling tendencies of the various samples.

We put our bauxite treating system into service in the fall of 1954 and since that time have had very satisfactory service. We have definitely recognized four improvements:

1. Fouling and corrosion have been greatly reduced throughout the entire liquid effluent fractionating system.
2. The deisobutanizer overhead recycle stream is dry.
3. Operating costs for treating the effluent have decreased.
4. The tetraethyl lead susceptibility of the alkylate has greatly improved.

Reduced downtime . . . Reduction in fouling and corrosion has greatly reduced downtime and maintenance costs. Even though we have had the filters in service since the fall of 1954 we have not had an opportunity to actually test the effectiveness of cleanup in the deisobutanizer tower. We have had over a 6-month run without any decrease in the efficiency of the tower when the plant was shut down for reasons other than fouling.

It is our standard procedure that whenever the plant is down we chemically clean the towers. As mentioned previously, before installation of the bauxite treaters we were getting only 2 to 4-week runs on this tower.

At the rerun tower we have put the reboiler back into service and are getting several months' run before it has to be taken out of service for cleaning. We have had to replace some risers, caps, and frogs only one time in this period and this was due mainly to a condition existing before the filters were installed. Over-all, we estimate that our maintenance and downtime due to corrosion and fouling has been reduced 85 per cent. This amounts to about $175 per day.

Reduced water content . . . The water content of the isobutane recycle stream has been reduced 200 lb. per day, resulting in an acid catalyst savings. Before installation of the bauxite treaters the overhead reflux drum at the deisobutanizer tower also served as a water separator. This water was introduced into the system by the caustic and water-wash operation. The recycle stream saturated at the conditions of the reflux drum, contained approximately 300 p.p.m. of water. We calculate from the equilibrium water content of bauxite that the recycle stream now has a water content of less than 10 p.p.m. The water content is so small that we are unable to get an accurate determination by conventional methods. The difference in water contents amounts to approximately 200 lb. per day. Considering that the useful range of acid catalyst is from 99 to 93 per cent, this means a saving of 3,300 lb. of acid per day, and at 1 cent per pound would mean $33 per day savings.

Reduced treating cost . . . The total cost for treating the effluent has been reduced. In this case I am not able to separate the costs of the liquid effluent system from the costs of the refrigeration - vapor - effluent system. However, there has been no change in the refrigeration-vapor-effluent system, and any difference in the cost was attributed to the bauxite treating. The total costs for caustic treating and corrosion inhibitors before installation of the bauxite filters was 2.6 cents per barrel of total alkylate. The comparable costs, using the bauxite treaters, is only 0.7 cent per barrel of total alkylate. This is a savings of 1.9 cents per barrel of total alkylate or a total savings of $50 per day in our system.

Fig. 3 shows the comparison of F-1 octane rating of caustic-washed and bauxite-treated alkylate vs. milliliters per gallon of TEL addition. You will note that for caustic - washed alkylate no lead appreciation was obtained until after 1¼ ml. per gallon of TEL addition. The bauxite-treated sample showed an immediate response. When the product is used as motor alkylate, this means a saving of $600 to $700 per day of tetraethyl lead. **End.**

How to Find True Resistivity From Three Normal Curves

This is a supplementary procedure for using Chart 8 in the Log-Analysis series by Dr. R. C. Hamilton and Paul Charrin (OGJ, Mar. 18, 1957, p. 121). It shows how to treat nonuniform formations, unreliable mud-resistivity values, and various hole diameters.

By Hubert Guyod and L. C. Kanner

THE Hamilton-Charrin series on quantitative log analysis outlines a method of curve matching for determining R_t from a system of two or three normal resistivity curves employing simplified departure curves. This method gives good results when the bed of interest is reasonably uniform and when R_m is known with fair accuracy. When these conditions exist, only two normal spacings will provide reasonable estimates of R_t.

When the bed of interest is not uniform, as is often the case for beds of high resistivity characterized by rapid vertical changes in porosity and cementation, and when there is some question as to the accuracy of the measured R_m, an accurate simultaneous matching of R_a/R_m values may not be possible.

In this case three normal curves, providing three R_a/R_m values, permit the determination of R_t with greater accuracy than if only two normal curves were available.

The following text describes a systematic method of curve matching, utilizing three normal resistivity curves, which takes into account that the formation may be somewhat nonuniform and that the reported R_m may be substantially in error. The method uses the same R_a index scales as are used for the matching procedure given in Part 5 of the Hamilton-Charrin series. In addition, a data sheet of the type attached, "Form Sheet for Systematic Curve-Matching for Three Normals," is required.

Procedure

1. Use the two charts, one for $D_i = 2d$, the other for $D_i = 5d$, which apply to the actual bed thickness of the formation being analyzed.

If the actual bed thickness is between the values for which charts are available, apply the steps outlined below for the closest bed-thickness chart above and below the actual bed thickness. Determine R_t for each case and interpolate linearly for R_t at the actual bed thickness.

2. Enter at the top of the form sheet the values $R_{16''}$, $R_{38''}$ and $R_{64''}$, measured in ohm-m. from the respective normal curves.

Enter the value of R_m from the log heading, after correcting for formation depth and temperature.

Record the bed thickness for the pair of charts being used. (This may not be exactly the actual bed thickness of the formation.)

3. In pencil, mark the values of $R_{16''}$, $R_{38''}$, and $R_{64''}$, on the three appropriate index scales of Chart 8. Transfer these to the straight edge of a piece of paper or transparent film. Indicate the left side of the scales also on the edge of the paper or film.

4. Start with the no-invasion curves (shown in solid lines on the charts) of the $D_i = 2d$ chart.

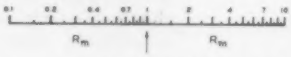
Move the paper or film vertically so that its top edge always remains parallel to the horizontal R_t/R_m lines of the chart.

Find the position (if it exists*) at which the plotted points of $R_{16''}$ and $R_{38''}$ on the paper or film each fall simultaneously on their respective no-invasion curves of the chart.

If, when the plotted points are matched to the black curves, the left-side index mark on the paper or film coincides with the left side of the chart, then the value of R_m (according to the $R_{16''}$ and $R_{38''}$ data) is 1.0, and this is recorded in Column 1 in Row 1 of the $D_i = d$ section.

However, if the index mark does not coincide with the left side of the chart, the value of R_m is different from 1.0.

In this case make a mark on the edge of the film or paper coinciding with the left side of the chart. Then, using the R_m scale below, or at the bottom of the form sheet, superimpose the mark made to indicate the left side of the scales on the arrow of the R_m scale. Read the value of R_m under the mark made to indicate the left side of the chart. Record this value in Column 4.



The R_m value recorded in Column 4 should be compared to the R_m value entered at the top of the form sheet. If the discrepancy between these does not seem so large as to be unreasonable,† the procedure is continued as under Step 5. If the discrepancy is

The authors are president and associate, respectively, of Well Instrument Developing Co., Houston.

*It is not always true that there is such a position. If not, write "no match" in Column 4 of Row 1 of the form sheet, and go on to the next row, in which the points $R_{16''}$ and $R_{64''}$ are matched.

†What size discrepancy in the values of R_m is sufficiently large to be "unreasonable" depends upon the source of the discrepancy. If the height range for which the plotted points, $R_{16''}$ and $R_{38''}$, match the curves is very narrow, then the discrepancy of, for example, 50 per cent can be regarded as too large, and the R_t that would be determined by continuing the steps would be questionable.

On the other hand, if the pair of points could have been matched to the curves almost equally well over a large range of R_t/R_m values, the height chosen as the one at which the best match is made may determine a value of R_m which is off by as much as a factor of 3 or 4 from the R_m value on the log heading, yet yield a value of R_t which is fairly accurate.

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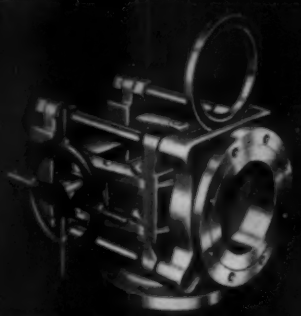

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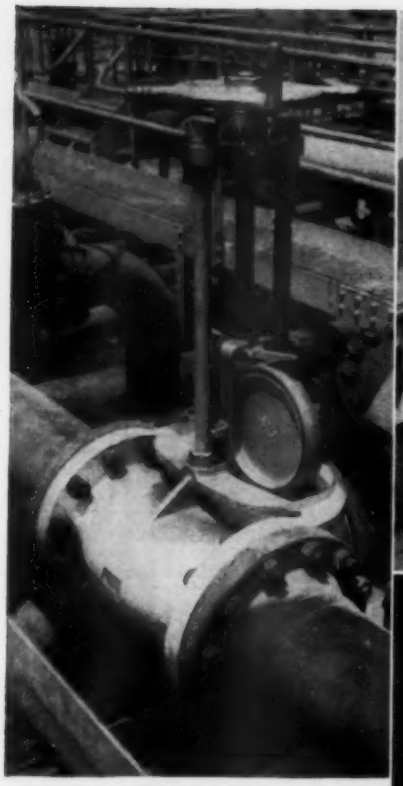

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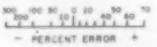
unreasonable go on to Row 2 of the form sheet, in which the R_{16}- and R_{64}- points are matched, and repeat the procedure.

5. Having matched the R_{16}- and R_{38}- points to their respective solid black curves, next determine how far the third point, R_{64}-, is from the no-invasion black curve for the 64-in. normal.

(a) Keeping the R_{16}- and R_{38}- points lined up, mark on the edge of the film or paper the intersection with the no-invasion 64-in. curve. The distance between this mark and the plotted 64-in. value is thus indicated.

(b) Refer to the per cent error diagram below, or at the bottom of the form sheet, to convert the distance mentioned above into per cent error.

Use when point is to the left of curve



Use when point is to the right of curve

Record the per cent error in Column 5.

6. When the R_{16}- and R_{38}- points are matched in the manner described above, read on the vertical scale at the left of the chart the R_t/R_m value.

Record this R_t/R_m value in Column 6.

7. Multiply the figures in Columns 4 and 6 to obtain: $R_m \times R_t/R_m = R_t$, and record in Column 8.

8. Columns 3 and 7 are left blank when matching the R_{16}-, R_{38}-, and R_{64}- values to the black (no-invasion) curves.

However, when matching the R_s data with the dashed curves, a certain value of R_i/R_m is assumed and this is entered in Column 3.

Multiply the values in Column 3 and 4 to obtain: $R_i/R_m \times R_m = R_i$, and record in Column 7.

9. Repeat the above procedure with the R_{16}-:R_{64}- combination and then with the R_{38}-:R_{64}- combination, entering the data opposite Rows 2 and 3 respectively. (The per cent error recorded in Column 5 always refers to whichever spacing is not mentioned in Column 2.)

Then, repeat the entire process, for the three pairs of spacings, for every D_i, and for every R_i/R_m value listed on the form sheet until data have been entered for Rows 1 through 27.

(It is possible there will be "no match" of the plotted points to the black no-invasion curves and no data will appear in Rows 1, 2, and 3. The analyst proceeds to Row 4 and attempts to match dashed curves, etc.)

10. Of the array of R_t values tabulated in Column 8, those corresponding to the "best matches" will be of the same order of magnitude, generally. Take their average value as R_t.

By best match is meant those having the R_m of Column 4 closest to the R_m given at the top of the form sheet, and the smallest per cent error in Column 5.

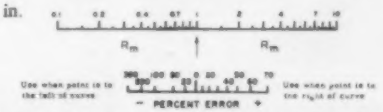
EXAMPLE 1

FORM SHEET FOR SYSTEMATIC CURVE MATCHING FOR THREE NORMALS
Supplementary Procedure for Use of Chart 8

DATA: e = 13 ft. 4 in.; d = 8 in.; R_m = 1.0 or R_m' = —; $R_{16''}$ = 17.5; $R_{38''}$ = 16; $R_{64''}$ = 10.

(1) D_i	Row	(2) Spacings matched (in.)	(3) R_i/R_m	(4) R_m	(5) Per cent error in matching third spacing	(6) R_t/R_m	(7) R_i	(8) R_t	Remarks
D_i=d	1	16:38	Solid	1.5	— 8	12		18	Reject for per cent error
	2	16:64	black	No match					
	3	38:64		No match					
D_i=2d	4	16:38	6	2.6		7.5			Reject for R_m
	5	16:64		4.6		3.3			Reject for R_m
	6	38:64		No match					
	7	16:38	11	1.6	— 7	11			Reject for R_m
	8	16:64		2		8			Reject for R_m
	9	38:64		No match					
	10	16:38	21	1.0	—12	15	21	15	Reject for per cent error
	11	16:64		1.2	+ 6	11	25	13.4	
	12	38:64		1.9	—12	7	40	13.3	Reject for R_m
	13	16:38	51	0.8	—12	12	40.8	9.6	Reject for per cent error
	14	16:64		0.9	+ 5	8	45.9	7.2	
	15	38:64		1.1	— 7	6	56.1	6.6	
D_i=5d	16	16:38	6	2.6	—15	7.7			Reject for R_m
	17	16:64		3.0	+12	5			
	18	38:64		6.0	—60	2			
	19	16:38	11	1.65	— 6	9.5			Reject for R_m
	20	16:64		1.7	+ 3	9			
	21	38:64		1.9	— 6	8			
	22	16:38	21	1.0	0	10	21	10	Best match
	23	16:64		1.0	0	10	21	10	
	24	38:64		1.0	0	10	21	10	
	25	16:38	51	No match					Reject for R_m, per cent error
	26	16:64		No match					
	27	38:64		0.52	+15	2			

True e of the bed: 13 ft. 4 in.



CONCLUSIONS: R_t = 10; R_i = 21; D_i = 5d; R_m = 1.0.

Remarks

1. Completion of every row of the form sheet in the manner described above provides a thorough exploration of the two charts for the bed thickness in question.

2. In each row, the entry in Column 1 tells which of the two charts to use; in Column 2, which pair of spacings to match, and in Column 3, what R_i/R_m is assumed so that the curve to use is identified.

3. Although the method works well in finding R_t, it generally gives only a crude estimate of R_i and D_i.

4. Even though it may be believed that the extent of invasion is larger than 5d (the largest invasion diameter given by Chart 8) the matching described above should still be attempted. Generally a fair estimate of R_t will result.

5. The procedure outlined above will give best results when R_m is approximately equal to R_s, or when R_t is several times greater than R_s. The latter condition usually exists when detailed curve matching is employed for quantitative analysis of thin, resistive formations.

Examples

1. Assume the following data are

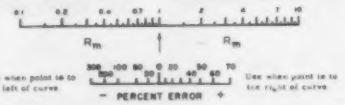
EXAMPLE 2

FORM SHEET FOR SYSTEMATIC CURVE MATCHING FOR THREE NORMALS
Supplementary Procedure for Use of Chart 8

DATA: e = 20 ft.; d = —in.; $R_m = 1.0$ or $R_m' = —$; $R_{16''} = 12.7$; $R_{38''} = 9$; $R_{64''} = 4$.

(1) D_1	Row	(2) Spacings matched (in.)	(3) R_1/R_m	(4) R_m	(5) Per cent error in matching third spacing	(6) R_t/R_m	(7) R_1	(8) R_t	Remarks
$D_1=d$	1	16:38	Solid	No match					
	2	16:64	black	No match					
	3	38:64		No match					
$D_1=2d$	4	16:38		4.2					Reject for R_m
	5	16:64	6	No match					
	6	38:64		No match					
	7	16:38		2.5					Reject for R_m
	8	16:64	11	3.5					
	9	38:64		No match					
	10	16:38		1.4	—35	4	29	5.6	
	11	16:64	21	1.8	+15	2.1	38	3.8	
	12	38:64		3					Reject for R_m
	13	16:38		.87	+ 1	.95	44	.83	
	14	16:64	51	.87	— 1	1	44	.87	Best match
	15	38:64		.85	+ 1	1.15	43	.98	
$D_1=5d$	16	16:38		3.7					Reject for R_m
	17	16:64	6	3					
	18	38:64		No match					
	19	16:38		1.65	—18	2.7	18.2	4.5	
	20	16:64	11	1.7	+ 9	1.8	18.7	3.1	
	21	38:64		2	—13	1.3	22	2.6	
	22	16:38		No match					
	23	16:64	21	No match					
	24	38:64		0.83	+11	1	17.4	.83	
	25	16:38		No match					
	26	16:64	51	No match					
	27	38:64		No match					

True e of the bed: 20 ft.



CONCLUSIONS: $R_t = 0.89$; $R_1 = 44$; $D_1 = 2$; $R_m = 0.86$.

to be processed by the method described above:

$R_{16''} = 17.5$ e = 13 ft. 4 in.
$R_{38''} = 16$ $R_m = 1$
$R_{64''} = 10$ d = 8 in.

The form sheet for this example contains the tabulation of data obtained from Chart 8. Referring to Columns 4 and 5 it is seen that only for Rows 22, 23, and 24 are solutions obtained for which the mud resistivity is reasonable, the per cent error low or negligible and the agreement between the R_t's is good. R_t is then 10 ohms. R_1 is 21 and D_1 is 5d.

2. Assume that the following data are to be processed by the method described above:

$R_{16''} = 12.7$ e = 20 ft.
$R_{38''} = 9.0$ $R_m = 1$
$R_{64''} = 4.0$ d = 8 in.

The form sheet for this example contains the tabulation of data obtained from Chart 8. Referring to Columns 4 and 5, it can be seen that only for Rows 13, 14, and 15 are solutions obtained for which the mud resistivity found is reasonable and the match is good for the third spacing. The average of the R_t's in these three lines, $(R_t)av = 0.89$, is an acceptable solution.

Hole Diameters Other Than 8-In.

As stated in the Hamilton-Charrin series, Chart 8 is constructed for a hole diameter of 8 in., but may be used with very little error for hole diameters from 7 to 9 in.

Actually Chart 8 may be used for a much wider range of hole diameters by applying the following procedure:

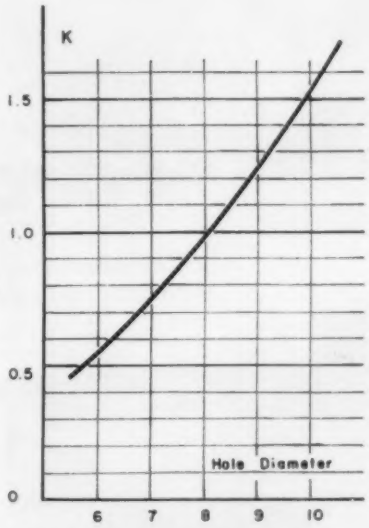
If the hole diameter is not 8 in., but is within the range of 6 to 10 in., the entire procedure described above is applicable, provided that wherever the procedure calls for the R_m va ue read from the log heading, a fictitious R_m' value is substituted for it.

This new R_m' value is obtained from the actual one by multiplying it by a k factor, corresponding to the hole diameter, taken from Fig. 1.

Example:

$R_m = 2.0$ at formation temperature (from log data)
d = 6 in.
k = 0.56
$R_m' = 2.0 \times 0.56 = 1.12$

$R_m = 2.0$ at formation temperature (from log data)
d = 9 in.
k = 1.26
$R_m' = 2.0 \times 1.26 = 2.52$



HOLE DIAMETER variation is compensated for by multiplying mud resistivity by k. Use result in place of R_m. Fig. 1.

Acknowledgment

The authors acknowledge the assistance of P. Charrin, president, Perforating Guns Atlas Corp., and Dr. R. G. Hamilton, Hamilton Well Log Consultants. Charrin first outlined the project and assisted in the preparation of the paper. Dr. Hamilton assisted in testing the method and procedures with actual electric logs where R_t and all formation data are known and in offering suggestions for organization of the instructions and data sheet.

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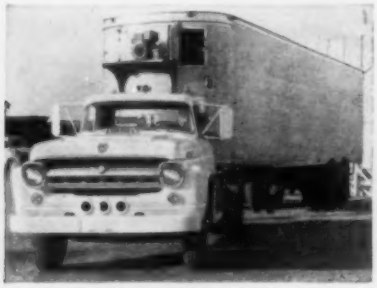

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ELEMENTS OF FIELD PROCESSING—40

How to calculate

Flowing B.H.P. of Gas Wells

By Dr. John M. Campbell
Chairman, School of Petroleum Engineering,
University of Oklahoma.

CALCULATION of flowing bottom-hole pressure is similar to that of static pressure, except that one must compensate for the friction loss, in addition to the head of gas acting on the bottom of the well. In all other respects, the handling of the factors involved is identical with static pressure (see Part 39).

The general equation for gas flow developed in Part 35 (OGJ, 6-10-57), expresses the general relationship involved. For gas flow in tubing, no external work is done, and kinetic energy effects are negligible, so that the equation reduces to:

$$\int V dP + \Delta x = - W_f \qquad (1)$$

with limits of P from P_1 to P_2.

where:

- V = specific volume of gas, cu. ft./lb.
- P = absolute pressure, lb./sq ft.
- Δx = depth of producing horizon, ft.
- W_f = work to overcome irreversible effects, friction, etc.

The work term W_f may be expressed in terms of the well-known Fanning equation:

$$W_f = \frac{2fhv^2}{gD} \qquad (2)$$

where:

- f = friction factor
- h = length, ft. (In this case Δx = h)
- v = velocity, ft./sec.
- g = 32.2 ft./sec.^{2}
- D = pipe diameter, ft.

A convenient solution is possible if Equation 2 is substituted into Equation 1, and the basic compressibility relationships are used for V. If an average well temperature T_a is assumed, one solution is:[1]

$$h = \frac{L_s}{1 + [3.81 \times 10^{-6} (QGL_s/\Delta P)^2 (f/D^5)]} \qquad (3)$$

where:

- Q = flow rate, M.M.c.f.d. at 14.65 psia. and 60° F.
- D = tubing diameter, ft.
- G = gas gravity (air = 1.0)
- ΔP = pressure drop, psi.

and

$$L_s = \frac{53.3\,T_a}{G}\left[\int_{0.2}^{P_{r1}} \frac{Z}{P_r}\,dP_r - \int_{0.2}^{P_{r2}} \frac{Z}{P_r}\,dP_r\right] \qquad (4)$$

Values of the integral in Equation 4 may be found in Table 1, Part 39. The bottom-hole pressure may then be calculated from Equation 3 by solving it for ΔP and adding the wellhead pressure at the given flow conditions.

An alternative approach is to incorporate the variation of temperature into the relationship.[2] Using the principles outlined above, an equation may be derived which takes the form:

$$18.75\ Gh = \int_{P_w}^{P_f} I\,dP = \int_{P_w}^{P_f} \frac{(P/TZ)}{F^2 + (P/TZ)^2}\,dP \qquad (5)$$

where:

- P^2 = $(psia.)^2$ in thousands (P^2/1,000)
- P = pressure, psia.
- T = temperature, °R.
- f = friction factor
- D = internal diameter, in.
- $F^2 = \frac{2.6665\,f\,Q^2}{D^5}$
- $I = (P/TZ)/[F^2 + (P/TZ)^2]$

The integral in the numerator must necessarily be integrated by numerical means, inasmuch as it contains three variables. The right-hand side of the equation may then be expanded to yield:

$$18.75\ Gh = \frac{P_2 - P_0}{6}(I_0 + 4I_1 + I_2) \qquad (7)$$

where:

- I_1 = value of I at P_1 when $P_1 = (P_0 + P_2)/2$
- I_0 = value of I at P_0 (P_w)
- I_2 = value of I at P_2 (P_f)

Equation 7 may be easily solved by trial and error if G, h, and P_0 are known.

Simplified method . . . Although it is not strictly speaking "correct," the following procedure has been found to be relatively easy and to yield satisfactory results:

1. Assume a pressure P_2.

$$18.75\ Gh = \frac{1/2}{\times [(P_1 - P_0)(I_1 + I_0) + (P_2 - P_1)(I_2 + I_1) + \ldots . (P_n - P_{n-1})(I_n + I_{n-1})]} \qquad (6)$$

where the subscripts 1, 2, n indicate arbitrarily chosen points in the well between the formation and the surface. P_0 would be the pressure at the surface (P_w), and P_n the pressure at the formation (P_f). Inasmuch as the left-hand side of the equation is known, the solution consists of choosing values of P until the equality is satisfied. This, however, is rather tedious in the absence of a computer.

Satisfactory accuracy may usually be obtained by a two-step numerical integration utilizing Simpson's rule. If this is done, Equation 5 may be written:

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2. Establish a point (1) so that h_1 equals one-half the total h, and P_1 is one-half the sum of the assumed value of P_2 and P_0 [$(P_1 + P_2)/2$].

3. Calculate F, knowing the flow rate and tubing diameter.

4. Calculate I_0, I_1, and I_2 from above, determining T_1 and T_2 from the temperature gradient, as shown in Part 39.

5. Substitute above values in Equation 7. If both sides of the equation do not check the equality within the desired accuracy, assume a new value of P_2, and repeat the above calculations.

The preceding is a short-cut method, but will normally yield results that have an accuracy as good as or better than the usual field data. Unless the well is very deep or has a large temperature gradient, the use of Equation 3 is usually preferred, because of its relative simplicity. In any event, either approach is recommended only for flow through tubing.

Although the writer considers the above as the two best general correlations available, instances arise where others might be used. For example, if such pressure calculations are in conjunction with a back-pressure test, the operator must normally use those equations set forth in the standard procedure prescribed by the state in question.

Gas-distillate systems . . . The above equations, although derived strictly for gas wells, may be used for two-phase, gas-distillate systems. Experience has shown that the equations are generally applicable for gas-liquid ratios as low as 30,000, if suitable pseudosingle-phase properties are used.

The specific gravity of such a stream may be calculated from the total well-stream composition (based on air = 1.0), from Equation 8, as used by the State of Texas,[3] or by use of Fig. 1.[4]

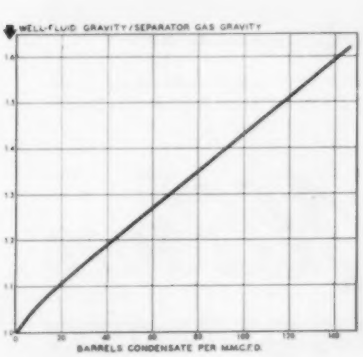

Fig. 1—Correlation for determining well-fluid gravity.

$$G = \frac{G_g + 4{,}591\, G_e/R_a}{1 + 1{,}123/R_a} \qquad (8)$$

where:

G_e = specific gravity of liquid (water = 1.0)
R_a = gas-oil ratio, s.c.f./bbl.
G_g = specific gravity of gas (air = 1.0)

Annular flow . . . For flow through the annulus between the tubing and the casing, the correlations presented are not entirely rigorous; but where such a problem exists, a good approximation results if D^5 is replaced by:

$$(D_1 + D_2)^2\,(D_1 - D_2)^3 \qquad (9)$$

where:

D_1 = internal diameter of casing
D_2 = external diameter of tubing

The units of D_1 and D_2 must be the same as the diameter they replace.

The friction factor, f, may be determined in many ways. The most rigorous values, however, utilize the standard f versus Re plot of the type shown in Part 28. This Reynolds number may be written as DG'/μ, in order to eliminate the variables v and ρ, which are functions of pressure. The quantity G′ is then the mass flow rate in lb./sec.-sq. ft., and μ is the viscosity in lb./ft.-sec.

A more convenient approach is afforded by an empirical examination of the Re versus f data,[2] in order to find f as a function of diameter. This yields two equations:

$$f = \frac{4.372 \times 10^{-3}}{D^{0.224}}$$

for values of D less than 4.3 in. and

$$f = \frac{4.007 \times 10^{-3}}{D^{0.164}}$$

for values of D greater than 4.3 in.

These have been found satisfactory, except in those few instances where their use gave slightly high-pressure drops.

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BOOKS

TEXTBOOK OF POLYMER CHEMISTRY by Fred W. Billemeyer, Jr., Published by Interscience Publishers, 250 Fifth Avenue, New York 1. 518 pp. $10.50.

This book was written as a textbook on the organic and physical chemistry of high polymers. It includes no original work but is a compilation and a classification of some of the more interesting and important information about polymeric substances.

The book was written for use in graduate-level courses on the subject but should be a valuable reference volume for the practicing chemist and engineer. The text is divided into the following subject matter: physical chemistry of polymer, kinetics of polymerization, plastics, and fibers and elastomers.

The book is written for the student or professional man who has had elementary training in organic and physical chemistry, elementary physics, and mathematics through elementary calculus. No prior knowledge of high polymer is assumed.

PILOT PLANT, MODELS, AND SCALE-UP METHODS IN CHEMICAL ENGINEERING, by Robert Edgeworth Johnstone and Meredith Wooldridge Thring. Published by McGraw-Hill Book Co., Inc., 330 West Forty-second Street, New York, 36. 307 pp. $9.50.

Here is the first full-length book treatment of a subject of interest to chemical engineers concerned with plant or process design. The book presents a study of the many ways in which model theory and empirical extensions of it can be used in the design of pilot plants and models, and in the interpretation and scaling up of experimental results.

The opening chapters deal with similarity, dimensional analysis, the regime concept, similarity criteria, extrapolation, and other theoretical principles. Later chapters show how these principles are used in the scaling up of a wide variety of chemical-engineering operations. The approach is analytical and quantitative, but with enough descriptive matter and worked examples to show how the principles are applied. The chapter deals at length with the mathematical theory of analogue models.

The departures in treatment and presentation include: extention of the concept of geometrical similarity to include elements and model elements as well as models; use of a simplified notation to express ratios of corresponding quantities in model and prototype; reduction of model laws to simple scale equations which enable experimental performance figures to be scaled up with very little calculation; and classification of literature references under subject headings.

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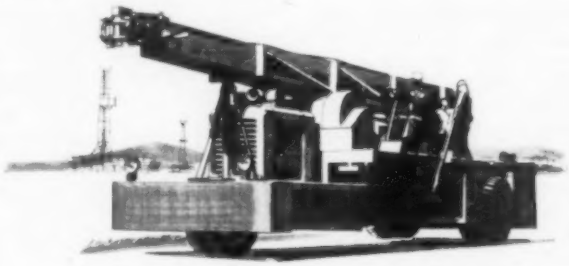

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Part 2

Laboratory Testing

JOB IMPROVEMENT FOR THE PROCESS FOREMAN—101

Suggested Sample-Handling Techniques

GREAT care must be taken during sampling and storage.

IT IS too often felt that the work of collecting samples is a nuisance. Therefore this seemingly necessary evil is assigned frequently to someone who is unfamiliar with the proper procedures and who may not realize the errors introduced by improper techniques. Since no analysis, however carefully performed, can be more reliable than the sample on which it is made, the greatest care must be taken during sampling and storage.

Analytical tests . . . Tests made on samples which do not properly represent the supply from which they are taken are of no value, regardless of the care used later in making analytical tests on such samples. Because the type of materials sampled and the various conditions of sampling govern the exact technique to be used, it is impossible to prescribe a rigid procedure which would apply in all cases. No set of directions for sampling, however exact, can take the place of judgment, skill, and experience.

Great caution must be exercised in sampling and handling samples of hydrocarbons because of the possibility of fire or explosion. Some of the more common mistakes made in sampling can be avoided by:

1. Recognizing upset or irregular conditions of the unit at the time of sampling. Unless you want to know how far off test you are, there is no need to sample a stream if the operation is known to be upset.
2. Selecting sample points that will give a representative sample.
3. Flushing the sample line free of the old sample standing in the line, being sure to follow good safe procedures.
4. Carefully inspecting the sample bottle or can for dirt, oil, or water before filling.
5. Catching the sample in a sample bottle rather than transferring it from one container to another.
6. Cooling hot or light samples before releasing the material into the sample bottle.

All sampling pitfalls cannot possibly be pointed out. In sampling, we must use good judgment and we must make use of experience.

Kinds of samples . . . Samples may be taken for any of several purposes and the purpose for which the sample is to be used will indicate the type of sample to be taken. Samples taken from operating units may be: (1) snap or spot samples, or (2) composite samples.

Snap or spot samples are used to obtain information such as the concentration, yield, gravity, etc., at a given time or spot. They usually are for the purpose of determining whether or not specifications are being met by the unit at that point and time.

Composite samples represent an average of the material taken over long periods. These samples generally are used to calculate over-all material balances, performance of the plant, etc. Since these samples represent an average over a time, it is necessary obviously that the samples be collected as uniformly as possible over the entire period.

This material taken from process-training-program manual, Baton Rouge, La., refinery of Esso-Standard Oil Co.

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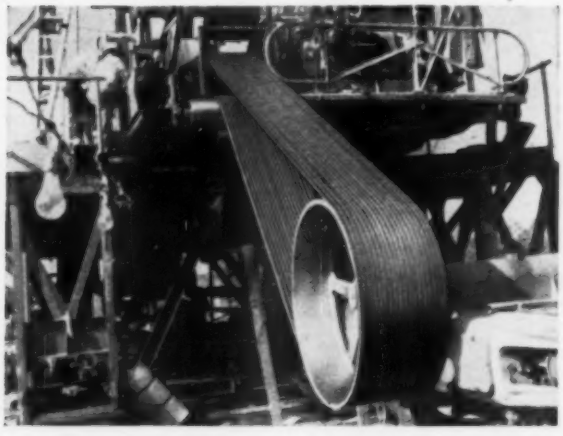

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By W. L. Nelson
Technical Editor

QUESTIONS ON TECHNOLOGY

Cracking-Equipment Obsolescence

Can you outline the development of cracking processes as you did recently for crude distillation processes? What can we expect in the future?—W.G.F.

Although at least 23 specific changes or additions to our methods of cracking and coking have occurred since 1860, only a few of these changes resulted in acute obsolescence. Thus a change can be expected at about 3-year intervals and the rate of change has not materially increased during recent years. The major changes which resulted in obsolescence were:

1925—Reaction chamber cracking—Burton process (1915).
1925—Reaction chamber cracking—Jenkins, etc. (1920).
1927—Reaction chamber cracking—Shell still coking (1910).
1932—Tube-still process—Reaction chamber (1925).
1932—Tube-still process—Gyro vapor phase (1929).
1932—Delayed coking—All coking processes (1927).
1932—Tube-still process—Hydrogenation (1931).
1952—Catalytic reforming—Thermal reforming (1930).

It will be noted that catalytic cracking is not considered as a process which caused serious obsolescence because it has been applied primarily as an addition to thermal cracking facilities. Nor have the fluid coking, propane decarbonizing, Houdresid, etc., processes required a replacement of existing facilities. They may yet do so.

Thus, only eight clear cases of obsolescence have appeared and at about 5-year intervals. Most of these have affected only minor parts of the industry, and when these are eliminated we are left with only three severe periods in cracking technology, namely, 1925 when the reaction chamber processes required abandonment of the Burton and other early cracking processes; 1932 when the so-called tube-still process replaced all other existing processes; and 1952 when thermal reforming rendered obsolete all practice of thermal reforming. Meanwhile improved processing methods, notably catalytic cracking, have continually called for large investments but no extensive abandonment of existing processes.

The feeding of residual stocks directly to catalytic reactors is a development that will probably appear, and we may expect the use of hydrogen in some form of heavy oil cracking system.

Table 1 only outlines the dates at which general acknowledgment was attained, not the date of patenting or invention.

DEVELOPMENT OF CRACKING PROCESSES

Although Prof. B. Silliman, Jr., of Yale University, recognized as early as 1855 that thermal decomposition or cracking took place (E. H. Leslie, Motor Fuels, Chem. Cata. Co., 1923, p. 329), and although a stillman inadvertently cracked in 1861 (David T. Day, Handbook of the Petroleum Industry, II, John Wiley & Sons, 1922, p. 427), little or nothing was done about it except to deliberately overheat the oil in a so-called "cracking distillation" for the production of larger amounts of kerosine (1865-1910) and later for the production of a larger amount and a more crystalline paraffin wax. Shell-still coking was also conducted extensively during 1907-1912 without steam and then with steam (1920) until the advent of delayed coking in about 1928. Coking operations were confined to areas where steel plate (bottom plates) could be had cheaply and where the market for coke was satisfactory.

However, as the demand for gasoline became urgent with the advent of automobiles, Dr. William H. Burton, of Standard Oil Co. of Indiana, developed (1910-1913) the Burton process. By 1921 there were more than 800 Burton pressure stills, and residuum or crude oil was used as charge stock as early as 1920 (Leslie, p. 360). Many other pressure stills were developed including the recirculation-type Jenkins still or process which is mentioned because a large number of units were installed just in time to be rendered obsolete by the reaction chamber processes (Tube and Tank, Cross, Dubbs, Holmes-Manley, etc.). The reaction-chamber processes were installed extensively during 1923-1935 but were in turn displaced by (or converted into) the tube-still (1926 date) process which is used today. Cracking is accomplished in the tubes of the pipe still of the tube-still process, and since its universal adoption, it has not been feasible to collect significant royalties for thermal cracking, coking, or reforming. The Gyro vapor-phase process (1925-1932) was also rendered uneconomical by the tube-still process except for the production of gases for chemical manufacture (especially during World War II). Coke was a natural byproduct of the reaction chamber processes, and occasionally these processes were operated specifically for the production of coke. However, the delayed-coking process (1928 to date) was readily developed because it also was only a modification of the tube-still process. Thermal reforming of naphtha has been practiced (1925 to date) in all types of cracking units but it was not used extensively until after about 1933. Likewise, viscosity breaking (1930 to date) could be accomplished in some degree by all of the processes but wide application was delayed until after 1939 and especially during recent years (1949-1957).

An ill-fated venture into destructive hydrogenation (cracking in the presence of hydrogen at high pressure) was undertaken by Standard Oil Co. of New Jersey and other refiners (1927-1933) but commercial operations were soon discontinued.

By 1939 the tube-still process was so completely developed, especially its use in combination with topping, that 6-year-old cracking plants were said to be obsolete. The Gyro vapor-phase process was applied to the cracking of gases (1934 to date) and it remains as the main ethylene producing process. Oven processes for the production of specialty cokes were de-

TABLE 1—CHRONOLOGY OF CRACKING PROCESSING

1855	Professor Sillman noted decomposition
1861	Cracking inadvertently discovered
1870 (1865-1910)	Dry or cracking distillation for kerosine
1910 (1905-1935)	Cracking distillation for paraffin distillate
1910 (1907-1912)	Shell still coking (dry)
1915 (1910-1927)	Burton pressure stills
1920	Burton handles residuums and crude oil
1921	Over 800 Burton stills
1920 (1917-1930)	Jenkins and other still processes
1922	Extensive use of steam in coking
1925 (1922-1935)	Reaction chamber processes (Tube and Tank, Cross, Dubbs, Holmes-Manley, (etc.)
1927 (1923-1933)	Reaction chamber processes produced coke
1929 (1925-1932)	Gyro vapor-phase cracking
1928 (1927-1945)	Gyro vapor-phase cracking for gases
1930 (1925-1956)	Thermal reforming of naphtha
1931 (1928-1932)	Destructive hydrogenation (cracking)
1932 (1928-)	Delayed coking
1932 (1928-)	Tube cracking and quenching (tube-still process)
1935	Tube-still process practiced by all
1936 (1929-)	Oven-type coking processes
1938 (1934-)	Gyro hydrocarbon cracking for ethylene, etc.
1939 (1930-)	Combination topping and cracking
1939 (1936-1950)	Houdry fixed-bed catalytic cracking
1939 (1930-)	Viscosity breaking
1945 (1937-)	Catalytic cracking processes
1944 (1941-)	Hydroforming
1949 (1938-)	Vacuum flashing for catalytic plant feed
1950 (1944-)	Propane decarbonizing of feed stock
1950 (1944-)	Solvent decarbonizing of feed stock
1952 (1950-)	Airlift T.C.C. and Houdriflow catalytic cracking
1952 (1949-)	Catalytic reforming (platinum catalyst)
1953 (1950-)	Continuous coking processes
1954 (1948-)	Catalytic cracking of residues (Houdresid)

veloped during 1929-1948, but they have not attained widespread use.

Houdry fixed-bed catalytic cracking was introduced in 1937 and many plants were in operation by 1941. Early in World War II, the fluid and bucket elevator Thermofor processes were introduced. The Hydroforming fixed-bed process for the production of toluene was installed in 1943, and although it has been modified by employing fluidization of the catalyst, most aromatics will probably be produced in the future by the platinum catalyst reforming processes.

After the war, catalytic cracking was rapidly introduced into all refineries and the present processes are primarily the fluid, T.C.C., Airlift, and Houdriflow processes, although Houdry Process Corp. is working actively (1954) on a process (Houdresid) which can catalytically crack residual feed stocks. Vacuum flashing was used extensively (1943) in the preparation of clean distilled charge stocks. Since 1952 propane decarbonizing, furfural extraction, etc., are being explored again as a means of obtaining hydrogen-rich metal-free charge stocks for the fluid catalytic cracking process.

Since 1950 nearly every refiner has installed some type of platinum catalyst reforming plant (Platforming) for upgrading the octane number of straightrun naphtha. Such processes are completely displacing all types of thermal reforming.

Fluidization has also entered the coking field (1950) as the continuous contact process and especially the fluid coking process. In time the fluid process may displace the older delayed coking process.

Blending Octane Number Of High-Octane Stocks

We note your excellent study of blending octane numbers in the September 19, 1955, issue, but what do we do with the new high-octane stocks such as catalytic reformates, aromatic extracts, etc.? F.W.T.

Unfortunately, by the time adequate data are accumulated, the industry moves forward to new unknown blending stocks. However, the octane numbers of a few blends are available in the excellent Du Pont publication entitled "Road Ratings of Tomorrow's Gasolines in Tomorrow's Cars" (March 1957).

Heretofore, when high-octane stocks were blended with rather low-octane base stocks, the octane number of the blend was always higher than the weighted arithmetic average of the octane numbers of the components. This resulted in blending factors (multipliers) in the following equation which were always larger than 1.0.

$$N = \frac{CP_bN_b + PN_a}{100}$$

in which:

N = octane number of blend
P_b = percentage of blending agent (volumetric)
N_b = octane number of blending agent
P = percentage of base stock
N_a = octane number of base stock
C = multiplier for octane number of blending agent

Now that high-octane stocks are being blended with each other, we encounter multipliers that most frequently have a value less than 1.0 (see Table 1). All of the Du Pont data are for fuels containing 3 cc. of TEL. The effect of test method (i.e., research or motor) seems to have little effect although in most instances the blending factors, when the research method is used, are slightly higher than the factors when the motor method is used. Fortunately, the results are quite uniform. Thus, the average factors are as follows:

Blending agent—	Multiplier for blending agent O.N. Research	Motor
Catalytic reformate	0.98	0.99
Heavy reformate	0.97	0.96
Catalytic cracked fuel	0.98	0.97
Aromatic extract	0.99	0.99
Th. cr. reformate	0.99	1.00
Trimer (with aromatics)	0.88	0.84

For many purposes a multiplier of 0.98 or 0.99 could be used for all blending agents (except trimer). The factors are lower when large amounts of blending agents are used. This effect and others are evident in Table 1.

TABLE 1—BLENDING FACTORS (MULTIPLIERS) FOR THE OCTANE NUMBER OF VARIOUS BLENDING AGENTS

Blending agent—	Base stock		Multipliers— Research	Motor
Catalytic reformate, C_5+	Light catalytic cracked		1.01	1.03
			1.005	1.013
			1.0	0.992
			0.977	0.986
		Ave.	1.0	1.0
Catalytic reformate, C_5+	Alkylates		0.980	0.980
			0.982	0.987
			1.00	0.99
			0.958	0.949
			0.987	0.988
			0.970	0.978
			0.945	0.977
		Ave.	0.98	0.98
Catalytic reformate, C_5+	2,3-dimethyl butane		0.958	0.995
			0.98	0.985
		Ave.	0.97	0.99
Catalytic reformate, C_5+	Commercial isopentane		1.00	1.005
Catalytic reformate, C_7+	Light catalytic cracked		0.982	1.006
			0.985	0.978
			0.976	0.956
			0.935	0.933
		Ave.	0.97	0.97
Catalytic reformate, C_7+	Pure isopentane		0.975	0.924
Catalytic cracked gasoline	Alkylate		1.010	0.970
			1.0	0.985
			0.983	0.935
			0.959	0.930
		Ave.	0.99	0.955
Catalytic cracked gasoline	2,3-dimethyl butane		0.958	0.962
Catalytic cracked gasoline	Commercial isopentane		1.01	0.982
Thermal cracked reformate	Light catalytic cracked		0.99	1.00
			1.0	1.0
		Ave.	0.995	1.0
Aromatic extracts	Light catalytic cracked		0.98	0.978
			0.99	1.0
			0.98	0.972
			1.0	1.0
			1.0	0.995
		Ave.	0.99	0.99
Aromatic extracts	Alkylate		1.0	0.992
Aromatic extracts	Commercial isopentane		0.972	0.975
			1.005	1.016
		Ave.	0.99	0.995
Aromatic extracts	Isomerizate		0.991	0.99
			1.0	0.985
			0.995	0.993
		Ave.	0.995	0.99
Trimer	Aromatic extract		0.876	0.841

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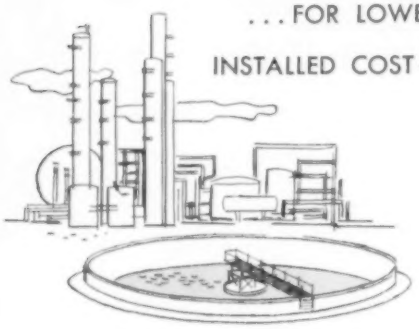

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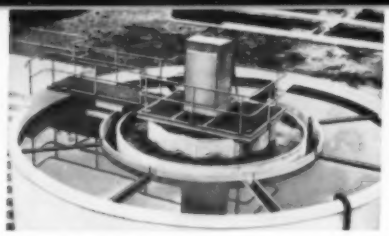

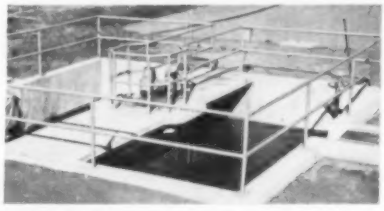

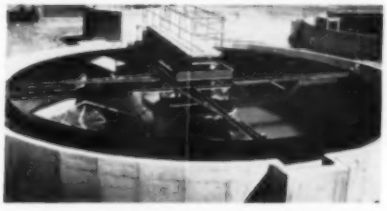

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Gas Measurement

First of a two-part article

Orifice-Meter Measurement Advances

By James L. Griffin

THE American Gas Association, the American Society of Mechanical Engineers, U. S. Bureau of Standards, and the U. S. Bureau of Mines participated in the Gas Measurement Committee Report No. 2 presented to industry in May 1935.

As additional gas reserves were developed, longer and larger pipelines were built and the industry found need for further data that would permit measuring gas through orifice-meter tubes of a diameter larger than those included in the report. And meter tubes made with heavier walls with a corresponding smaller internal diameter for operating at high pressure were found to be needed.

Report No. 3 . . . In response to industry's request for such data, the A.G.A. in conjunction with the USBS, and the A.S.M.E. again reviewed the previous work, conducted additional research, particularly at the 30-in. test setup at Refugio, Tex., and published a report in April 1955. This report was labeled Gas Measurement Report No. 3. It included orifice factors for large-diameter pipe and different wall thicknesses, other related factors, and further refinements for large-volume gas measurements.

Gas-delivery contracts relating to measurement have been expanded, not necessarily changed. Details were formerly left to measurement departments but now the legal document frequently sets out in detail what must be done. A.G.A. Report No. 3 furnishes the scientific and legal foundation for orifice-meter measurement.

While the present type of mercury manometer orifice-meter gage has remained practically unchanged in recent years with the exception of the type of material used and the manufacturer's know-how, work is continually being done to improve present instruments and to develop new ones.

Author is with Northern Natural Gas Co., Omaha, Neb. Paper presented at American Gas Association Transmission Conference at San Francisco.

Instruments are now available that operate controls as well as record differential and static pressure. Instruments that will transmit and reproduce duplicate charts at some distantly located point are available now plus instruments that will totalize the flow data and transmit such totals to a distantly located point or print the results on a tape.

Diaphragm type of orifice . . . Growing in use is a diaphragm type of orifice-meter gage that permits changing the differential range by means of replaceable range springs. The accuracy of these meters is less disturbed by nongaseous elements, such as liquid hydrocarbons, than is the case with mercury type of meters.

Experiments are continuing on an instrument that will correct automatically for all variables in the present formula. Such an instrument is presently called a mass-flow meter with the resultant volume expressed in cubic feet or pounds per period of time.

There is now a laboratory model of an orifice meter that uses a strip chart and an integrator for calculating volumes from a strip chart.

One of the essential factors to be determined for use in computing gas flow is the specific gravity of the gas as compared with air. In 1930, a specific-gravity balance of the Edwards principle was presented to the industry and this type of apparatus has been in general use since that date. With gas being collected from divergent sources of different specific gravities and then combined in a common stream, the spot tests obtained by the gravity balance did not suffice when high degrees of accuracy were essential.

To remove the discrepancies caused by varying specific gravities, recording gravitometers have been designed that give results accurate to plus or minus 3 in the third decimal place when compared with the standard balance or with standard gases that are obtainable from the U. S. Bureau of Standards with certificates of accuracy. A growing practice is to house these instruments in air-conditioned rooms to improve performance and reduce the need for attention.

Weights and measurements are by law tied to standards established by Congress and administered by the U. S. Bureau of Standards. In addition to the national standards, a number of states have legally defined the cubic foot of gas at a stated base pressure, temperature, and deviation factor of 1 at base conditions. These standards for gas measurement established by the various states are not necessarily the same as the national standard for a cubic foot, the primary difference being in the base pressure and method of correcting for compressibility when gas is measured at higher pressures. One of the formerly ignored or assumed factors was for correcting the effect of supercompressibility.

As metering pressures increased, the effect of supercompressibility was more forcefully brought to the industry's attention and factors to correct for this effect were developed through a special A.G.A. research project and included in Measurement Report No. 3.

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Better Management

EXTRA DIVIDENDS . . . The byproducts of writing skill are almost as important as the skill itself. Developing skill in writing carries with it other improvements in one's personality and ability. Let's examine some of the "extra dividends" . . .

Why write? . . . Making reports, whether routine or special, is part of every supervisor's job. If reports are well written, they save the time of everyone who reads them. Further, they assist you in decision making because the orderly process involved in writing a report helps you organize your thoughts and analyze the issues involved.

Simple approach . . . We have all seen written instructions misfire because they failed to "reach" the reader. Getting the point across is best accomplished with few and short words and simple sentences. Big words and complicated sentences lay a smoke screen over the real ideas you are selling. And, make no mistake, some of your best selling can be done on paper.

What Presentation to Use

Printed form reports . . . Most companies have printed forms for reporting such subjects as test data, job items, accidents, equipment maintenance, personnel performance, employe ratings, suggestion-system recommendations, quality inspection, and customer complaints.

Filling out these reports is generally a matter of standard practice and procedure, and is usually routine. These reports are extremely important. They can be a prime factor for many decisions. Always keep the end use in mind. Tell all the facts that you know are pertinent to the report. It is a good idea to check some of your recent reports with your boss or the person who received them to be sure you are on the right track. Ask for suggestions or comments.

Memos . . . A memo (short for memorandum) is used primarily in interdepartment communication. Whether on printed company memorandum form or typed, it very often follows the customary style.

The body of a memo should deal briefly and directly with a single subject. Normally, it is limited to the following questions: What are the facts? What do the facts mean? What ought to be done about the facts or a situation?

Because of its simplicity, use the memo as a starting point to develop your mastery of report writing. Practice writing a memo to confirm a conversation with someone. Or, compose a memo in which you try to clear up a misunderstanding. Or, put some instructions or an explanation in memo form. Or, report briefly on the progress of a certain project. Make the memo short. **If at all possible, stick to one page.**

Formal reports . . . Formal reports vary widely in arrangement. Each supervisor should check to see if his company or boss prefers a given setup or method of presentation. If there is no preference, the following may be used as a guide:

I. Title
II. Table of Contents (optional)
III. Introduction
IV. Summary of Conclusions and Recommendations
V. Body of the Report
VI. Appendix (when needed)

RATE YOUR WRITING

1. Do I habitually postpone and avoid all writing?
2. Am I self-conscious about my lack of writing ability?
3. Has a memo to someone misfired?
4. Do I only put things on paper when specifically requested?
5. Do I get swamped with the details involved in writing?

If the answer is "Yes" to any of the above questions, this Skill Study can help you.

TIPS ON MEMO A

Placing a complete, well-written report on the boss' desk will give you a feeling pride and accomplishment. Some supervisors may shy away from the written wor because they lack both confidence and know-how. This Managerial Skill Stud will help you develop necessary skills and techniques so that you can "talk paper" in an orderly, concise, and competent fashion. It will insure that your idea get better attention and consideration.

The "Title" should be placed in the center of the front page. Your name and the date should be on the lower right-hand corner. A short title that specifically describes the subject of the report commands immediate attention. Take care, choose it well!

The "Table of Contents" is frequently used in lengthy reports. In brief reports, it can be omitted.

The "Introduction" covers background material explaining the purpose of your report. A typical beginning might be, "Recent quality-control checks show the rejection rate has risen 10 per cent in Department X. Therefore, the purpose of this report is to . . . . ."

The "Summary" is meant for the reader who may not take time to read your whole report but is interested in your recommendations. In the Summary, you merely state your conclusions without elaborating on them. You may do this by summing up your ideas in a short paragraph. Or, you may break up your comments by enumerating the points in a column, as:

1.
2.
3.

In the Summary, you are delivering your "punch line." **Take time to make it effective.** It may be the most vital factor in getting your report across.

The "Body of the Report" is where you present your substantiating information, facts and data in detail. Here is the proper place to discuss your views and opinions. Everything must be presented in a logical order so that it all ties together in supporting your recommendations. Whenever possible, use known facts. However, if you are assuming something, don't fail to say so. Honesty and integrity are necessary or the reader will discount the whole report at the first loose or inaccurate statement.

The "Appendix" may be necessary if you include any exhibits that you refer to in the report, such as previous reports, time studies, graphs, blueprints, calculations or other statistical tables and compilations. Unless the report is of a technical nature, an Appendix is usually not required.

How to Begin

Where to write . . . Unless you have a quiet office where you are not likely to be disturbed, your best bet is to work on an important report at home. Spread out your material on a table or desk. Before starting get eve you need. Be in the mood to do a good job.

Your report is actually started long before down to write it. You may be preparing a rep your own initiative. If so, keep in mind the one purpose that is inspiring your action. Analyze wha you have, and those that you need to put over you point. Make your arguments as airtight as possibl

On the other hand, you may be writing a re response to a request from your boss. The proce the same. In addition, you must check and double to make certain that you have answered all the he mentions and have anticipated the questions h have about your statements.

No matter how well you have phrased your it is worthless if it does not convey your though rectly or give the answers your boss requires.

A starting guide . . . Following is a guide for started:

1. Understand thoroughly what you are to report
2. Ascertain all possible sources of information
3. Decide what sources to draw upon.
4. Gather the evidence.
5. Sift the evidence.
6. Review the evidence.
7. Keep what is useful—discard the rest.
8. Organize the evidence in logical order.
9. Summarize your findings.
10. Write the report.

How to Write the Report

Framing thoughts . . . When you have organized th dence in logical order and summarized your fi (Steps 8 and 9 above), you are ready to prepare a line. Developing an outline is the ideal way of pre to write because:

1. It is easier to move items in an outline from to place than it is to rearrange the report after written.
2. Outlining shows up gaps in ideas or data.
3. The general theme will be clearer in your after preparing the outline.
4. The outline serves as a "road map" to kee on the track as you write.

AND REPORT WRITING

Make the outline with the same care that you use to plan a trip. It is not just a bothersome step, but the major tool in producing a report with a minimum of rewriting and a maximum of effect.

Words and sentences . . . You may have heard a person about to write a report remark, "I know what to say, but I'm not sure that I use the right words. I never did well in English." The answer is simple. **Using your own words, say aloud exactly what comes to mind.** Stop at the end of one thought and write it down. Shortly, you will be writing directly on paper. Remember, the whole idea is to express yourself on paper just the way you would in giving a verbal report.

One of the handiest items in report writing is a good dictionary. Use it if you have a question about the meaning or spelling of a word. Caution—don't fill the report with big words to impress the boss. It's good to increase your vocabulary, but stick to words that are commonly used. Also, use the appendix of your dictionary to help in punctuation and capitalization.

Proofreading . . . When the rough pencil copy of your report is finished, put it away in a safe place and forget it for a day. This permits you to look at it anew from a fresh approach when you are more likely to catch careless errors, faulty punctuation, poorly composed sentences, or other omissions. Read it over aloud. If you stumble over a sentence, phrase, or word, take a second look. Make corrections. Now try it out on an associate, friend, or your wife. Listen to their criticisms and make changes that you agree with.

At this point check the report for over-all effect. See that it contains Prof. James Williamson's "Seven C's of Good Report Writing":

Clearness	**Courtesy**
Completeness	**Candor**
Conciseness	**Character**
Correctness	

Putting report together . . . When the written manuscript is given to the typist, explain exactly how you want it put together. Review underlinings, spacing, indentations, margin, number of copies needed and general makeup with her. If she is an experienced typist she will probably be able to give you a few good recommendations. When it is typed, checked, and stapled together, you will have a product that you can be proud of. **Present it with pride to your boss.**

This report prepared by and published through the courtesy of Elliott Service Co., Inc., 30 N. Macquesten Parkway, Mount Vernon, N. Y.

CHECK YOUR WRITING

To how many of the following questions can you answer "Yes"?

	Yes	No
1. CLEAR		
Are the words the simplest that could be used?	☐	☐
Do the words exactly express the thought?	☐	☐
Is the sentence structure clear?	☐	☐
Is each paragraph one complete thought unit?	☐	☐
Are all of the thoughts in proper order?	☐	☐
2. COMPLETE		
Does it give all necessary information?	☐	☐
Does it answer all possible questions?	☐	☐
3. CONCISE		
Does it contain only essential facts?	☐	☐
Does it contain only essential words and phrases?	☐	☐
4. CORRECT		
Do the statements conform with policy?	☐	☐
Are the facts accurate?	☐	☐
Is the grammar—spelling—punctuation—correct?	☐	☐
5. COURTEOUS		
Will the tone bring the desired response?	☐	☐
Is it free from antagonism?	☐	☐
Is it free from preaching and overbearing statements?	☐	☐
6. CANDID		
Have I been fair and honest?	☐	☐
Is it overcritical of any person?	☐	☐
Have I given credit where credit is due?	☐	☐
7. CHARACTER		
Is it neat in appearance and makeup?	☐	☐
Does it truly represent me?	☐	☐

On the basis of this appraisal sheet, judge each memo or report you write before you deliver it. Your answers will help you to decide where your report writing needs improvement.

Wagner TRANSFORMERS...THE CHOICE OF LEADERS IN INDUSTRY

Where uninterrupted power is a must...

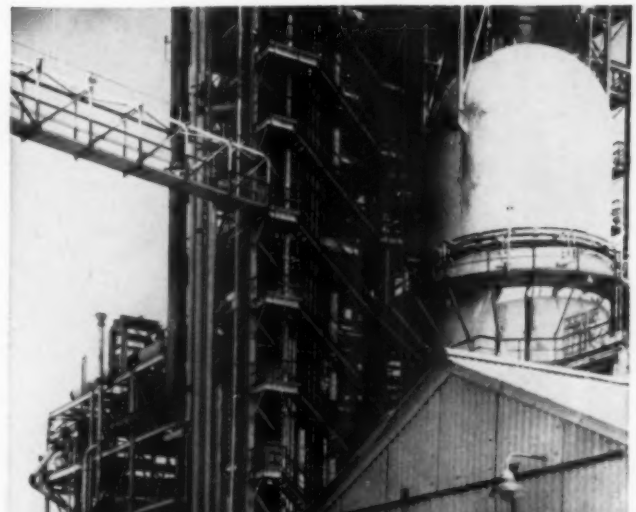
WAGNER UNIT SUBSTATION TRANSFORMERS

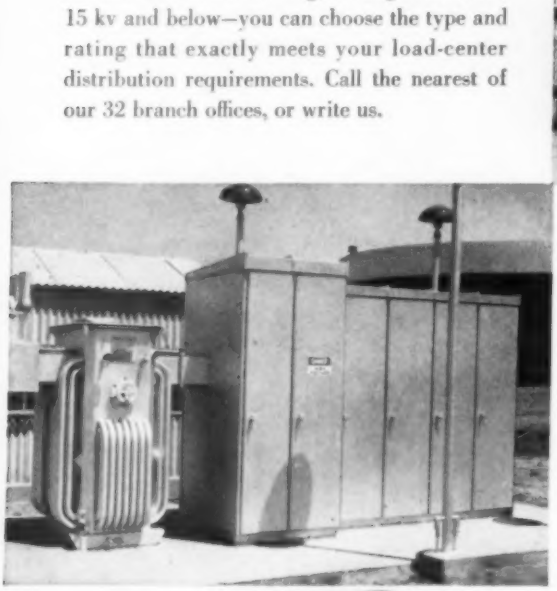
A completely dependable power supply is a vital necessity to an oil refinery. A power interruption of only a few minutes on a "cat cracker," like the one shown at the right, would completely disrupt this important processing operation and cause a shut-down of the entire refinery.

That's why you'll find Wagner Unit Substation Transformers at work at the Carter Oil Company refinery at Billings, Montana.

Wagner transformers are often found in installations where power supply failure would incur great loss because they have a reputation for complete dependability—backed by sixty-five years of transformer building experience.

Wagner Unit Substation Transformers, both liquid-filled and dry-type, are carefully designed to meet distribution requirements. Both liquid-filled and dry-type unit substation transformers are built in ratings through 2000 kva, 15 kv and below—you can choose the type and rating that exactly meets your load-center distribution requirements. Call the nearest of our 32 branch offices, or write us.





The 750 kva, 2400/4160Y to 480 volt, 60 cycle, three-phase, liquid-filled Wagner Unit Substation Transformer feeds the catalytic unit at The Carter Oil Company refinery. At left is shown a 225 kva Wagner substation transformer connected to an outdoor substation at the same refinery. Purchased and installed by The Fluor Corporation, Ltd., Engineers and Constructors for the Petroleum, Chemical and Power Industries, Los Angeles.

* * *

Write for Bulletins TU-205 and TU-214. They give full information on Wagner Unit Substation Transformers. Consult the nearest of our 32 branch offices about your next transformer installation.

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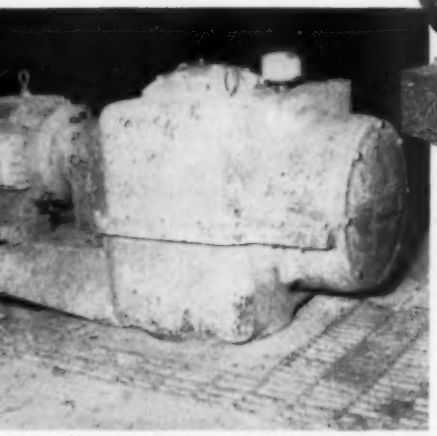
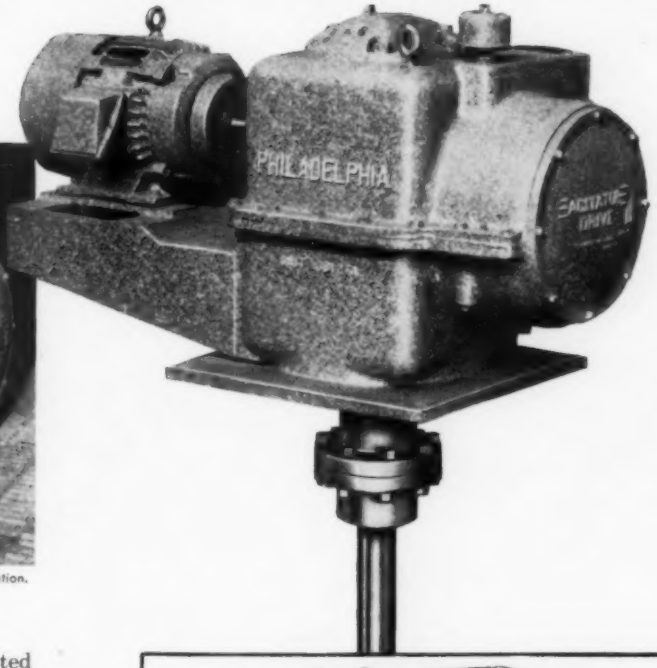
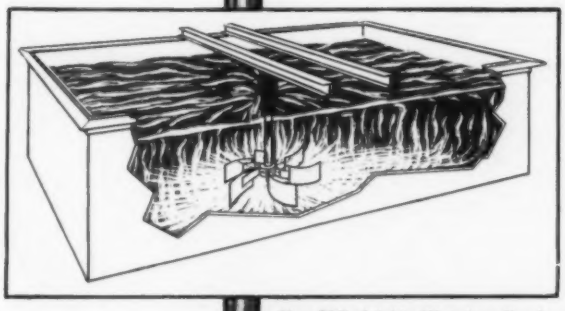
PHILADELPHIA MUD MIXERS...

re rugged–for more years of dependable service

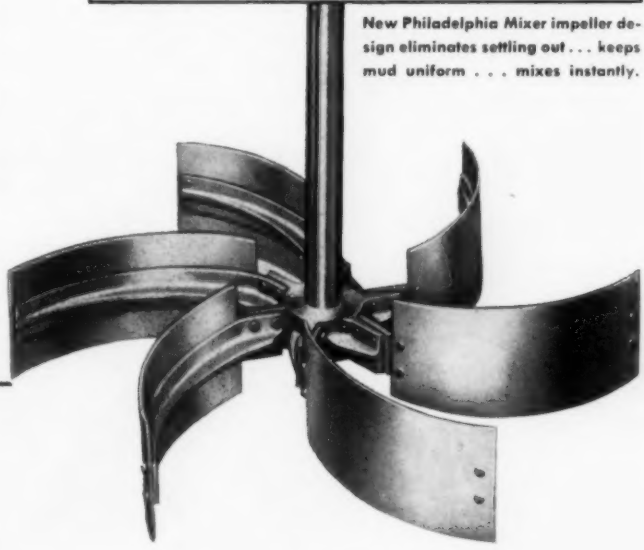


a number of heavy duty Philadelphia Mud Mixers now in operation.





New Philadelphia Mixer impeller design eliminates settling out . . . keeps mud uniform . . . mixes instantly.



spension of Drilling Mud:

turbine type mixer has become the accepted dard wherever holes are being drilled— g the job with less horsepower, providing e dollar savings in pump maintenance costs. adelphia Mud Mixers, with higher torque city, have provided outstanding perform- in drilling mud suspension.

ngest, Lowest Cost Mixer Service Severe Conditions:

adelphia Mixers and Mixer Drives have recognized for outstanding durability for 30 years. Each vital component in these rugged drives is supplied with the extra city that means added years of service. y shaft in each drive is oversized to ate maximum shock loading encountered vere service—then supported by big, high city roller bearings. Every design feature es for more years of service, more cost gs to the user.

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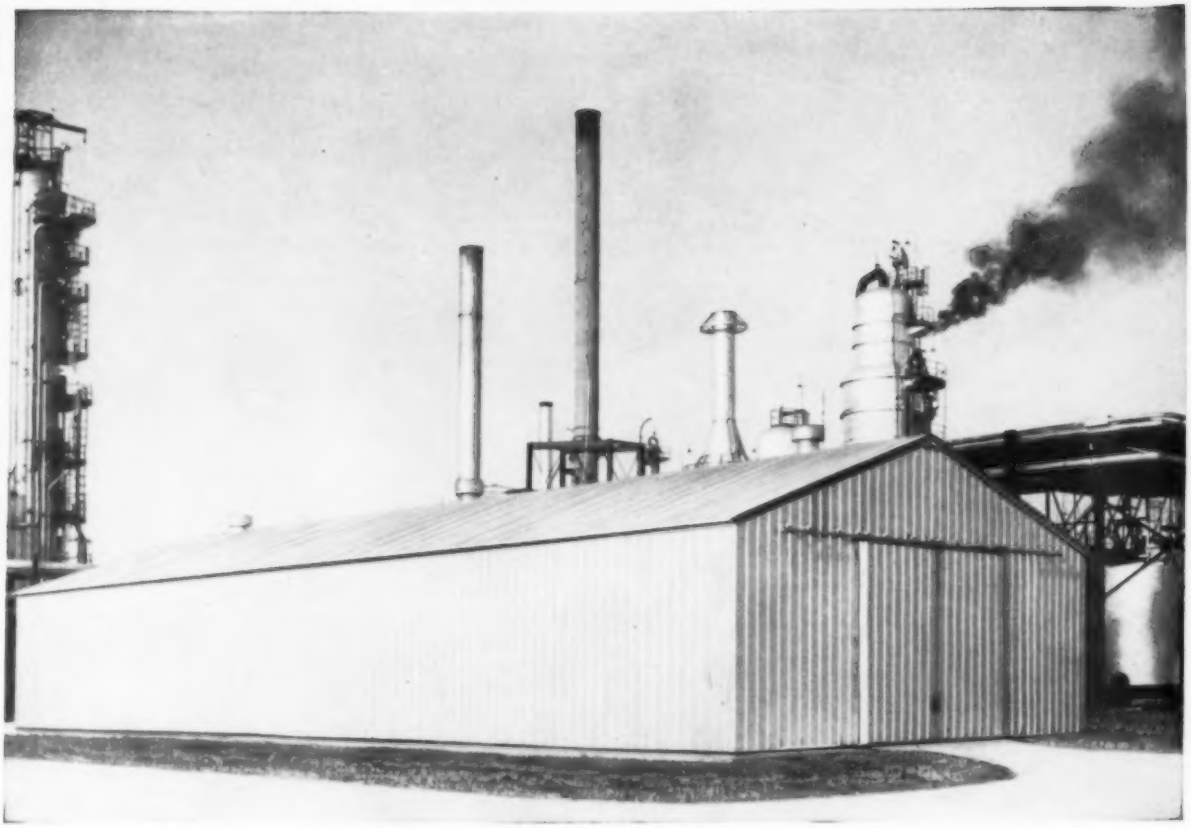

Butler storage building 100 feet by 40 feet. Offers maximum storage area in a quality building that is modest in cost.

Here's why you can order **Butler** *metal buildings from stock*

Butler metal buildings are America's most popular metal buildings. Their quality made them popular—and their popularity makes it possible to carry large inventories. For this reason, you can order the exact Butler building you need right out of inventory from the world's most complete selection of sizes.

Erect it with your own crews, or use your Butler Builder's team of construction specialists. Your Butler building is pre-engineered, pre-punched and pre-fitted for quick, accurate assembly.

No field flashing is required. All Butler panels are die-formed for precision fit which includes one-piece corners and one-piece roof ridge. They bolt into a one-piece steel structure that is impervious to wind, rain or snow. It is attractive, permanent and requires practically no maintenance.

Throughout the gas and oil industry, you can see Butler metal buildings at work as pump houses, garages, reclamation shops, field offices, gas compressor stations—in short, wherever a low cost, high quality building is required.

Butler building used as an oil tool supply store. Note how the attractive front adds to its commercial appeal.

For more information on how to build a quality building faster, phone your Butler Builder. His name is listed under "Buildings" in the yellow pages of your telephone directory. Or write direct for brochure, "Butler Steel Buildings for the Oil Industry."

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8,000 to 11,000 records are microfilmed daily . . .and when needed are easily read. Result:

Two cabinets save 160 four-drawer files

Texas Gas microfilms all its important papers for economical filing

By E. T. Bowers

COMPRESSING huge volumes of natural gas to make the most of pipeline space is standard practice in the transmission industry.

Texas Gas Transmission Corp., which has 22 compressor stations and 3,700 miles of pipeline, is using a comprehensive microfilming program to make the most of filing space—to compress our files, so to speak.

This microfilming program is reducing the space required for filing essential company records from 160 four-drawer files to a single film-storage cabinet.

The high cost of floor space, together with certain safety and quick-reference advantages offered by the microfilming process, contributed greatly toward the Texas Gas decision to adopt this means of storing records about 9 years ago. Another factor was the FPC requirement that companies under its jurisdiction keep a permanent file of many of its records.

To Texas Gas this means that a veritable mountain of paper in the form of records and vouchers piles up every day.

Microfilming started . . . When Texas Gas was merged in 1948 with two other companies, it became necessary to move a 20-year accumulation of records into the general offices at Owensboro. They were microfilmed. Our microfilm section was set up in 1949. A rented machine was operated by employes who could spare a few hours from their regular jobs. Later the task was assigned, as a sideline, to one of the men in charge of receipts and disbursements.

By 1955, it became obvious that we had too much work to be handled this way. We bought a Remington-Rand dual film-a-record camera, an electronic AO reader and a Model 9 reader. In May of 1956, we put the microfilming operation into the record and filing section under a supervisor who has three assistants.

When we started using our microfilming equipment, we processed 1,500 to 2,000 records a day through the machine. Speed increased, however, when a specialist sent in by the manufacturer showed us how to eliminate waste motion by using both hands in feeding papers into the machine. Our operators soon learned that semiautomatic feeding may be accomplished by hand if the papers are fanned out and placed against the feeding throat.

The operators themselves worked out a feature that further increased their speed. One microfilms for an hour while another prepares copy for the machine. Then they exchange tasks. This keeps them from doing the same job throughout the work day and speeds up the operation. A third person handles most of the film checking, mailing, and keeping work available while the other two are doing the camera work. All three, however, are trained in the procedure.

These little tricks have enabled the department to increase production to 8,000 to 11,000 exposures a day. At the end of each year we microfilm all of our plant records. Although the originals are kept in the general offices, microfilm provides an important added safety factor.

Records microfilmed . . . Our film-a-record unit is used also for recording and preserving vouchers, about 1,500 of them a month, with an average of eight pages in each; purchase orders; expense accounts; and plant records for security. Eventually we plan to photograph all of our checks. Operational reports for the pipeline also are put on film, and we are considering microfilming our press clippings.

Author is comptroller, Texas Gas Transmission Corp., Owensboro, Ky.

ARMSTRONG BROS.
Better PIPE TOOLS

CHAIN TONGS

"Reversible", "Standard" and "Ideal" types, in all sizes. *Jaws* are drop forged from special steel, are carefully milled, heat treated, hardened and tested. The *Handles* are forged spring steel. The *Chains* are proof-tested to ½ catalog strength (1,200 lb. to 40,000 lb.). "Reversible" Jaws give double jaw life. "Standard" jaws have extra bearing on the handle and forged-in chain guides. The "Ideal" Tongs have V shaped teeth for a sure grip on irregular shapes—fittings, etc.

Write for Catalog

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MAP FILE

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Easiest way to file and find confidential maps, tracings, blueprints. Quality metal cabinet file with locking doors. 112 tilting tubes handle 60" prints. Tubes indexed for quick location. Ideal for field and home offices. Shipped from stock.

Patent No. 1610368. Other Patents Pending.

SCOTT-RICE CO., 610 S. Main, Tulsa 3, Okla.

PIPELINE PATROL

Before the microfilm equipment was installed, we needed nine five-drawer file cabinets to preserve a single year's collection of vouchers. These important records now are photographed on 40 reels of microfilm of 100 ft. each.

A single microfilm storage cabinet housing about 1,000 of the 100-ft. rolls will hold records formerly requiring 160 four-drawer cabinets. With the combination of valuable space saved and improved filing efficiency, we intend to expand this work to obtain maximum benefits.

How Plantation spotted line leaks

Soil-potential survey locates the hot spots

PLANTATION PIPE LINE CO. used a soil-potential survey to locate hot spots on the 47-mile, 4-in. Bremen-LaGrange, Ga., lateral to aid maintenance crews in looking for leaks on the products system.

The line, lying generally in red clay hills with soils ranging from 30,000 to 230,000 ohms per cubic centimeter, was laid bare in 1941, except for short lengths out of Bremen, LaGrange, and two sections crossing two main rivers and low bottom land. There were no leaks through 1952, when cathodic protection was beginning. There were 5 leaks in 1953, 6 in 1954, 9 in 1955, and 13 in 1956.

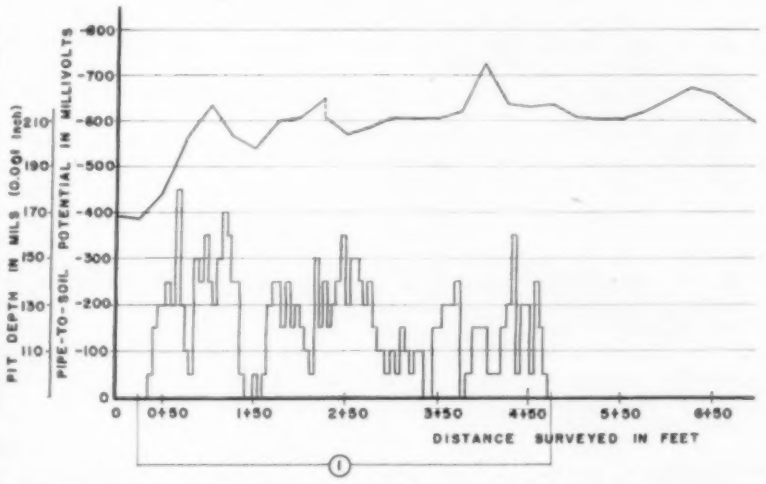
Leaks were hard to find because they were small and couldn't escape through the baked clay to the surface. They were detected only by dispatching department delivery shortages. The survey was run to pin point the hot spots so when shortages were reported, maintenance men could look for leaks first at the flagged points.

Digested from "Correlation of Pit Depth and Soil Potential Surveys," by George M. Jeffares, Plantation Pipe Line Co., Atlanta, presented before N.A.C.E. at St. Louis.

The survey was made at 25-ft. intervals. At any peak or reversal of potential, smaller drops were taken to pin point hot spots. To confirm severity of indicated hot spots, four different sections of pipe totaling 1,141 ft. were dug up and the pits counted and measured. The number of pits were plotted against distance as was the deepest pit per section. When these curves are compared with the graph of the potential survey, there is a definite increase in the number and depth of pits where there is a reverse in the pipe-to-soil potentials. Excessive corrosion was found at most of these peaks.

The potential survey indicated 10 distinct peaks or hot spots. Actual pipe examination showed eight of these to be points of greater corrosion attack than the surrounding pipeline. While it isn't infallable, the potential survey can be used as a tool to help locate areas to be recommended for reconditioning.

Plantation will of course continue to use the survey to locate anodic areas in need of additional protection.



TROUBLE SPOTS are indicated by soil-potential survey which helps to located pipe areas to be reconditioned.

The world's deepest well...

How Johns-Manville Wildcat® slush pump Packing helped set new depth record

Cutaway shows how Wildcat rings provide tight sealing with low friction.

One of today's outstanding engineering achievements is the record-breaking well drilled to 22,570 feet by Richardson & Bass, John W. Mecom and Freeport Sulphur Company. Contributing to this technological feat was Johns-Manville's Wildcat Packing—employed as standard packing for the two slush pumps.

This new packing proved itself more than equal to the unusually severe conditions on this rig. Pumps operated at a pressure of 2700 psi at approximately 35 strokes per minute. 12 hours were required for complete recirculation of the mud which had a high density of 18 lb. and a pH greater than 12.

The Richardson and Bass drilling team reported that Wildcat kept their slush pumps working far longer than is possible with old-style slush pump packing, virtually eliminated rod scoring and reduced packing replacement to the absolute minimum. On the rare occasions when repacking was necessary, Wildcat's ease of installation greatly sped this operation . . . cutting costly down time.

Developed especially for slush pumps

Engineered for its job, Wildcat provides highly effective sealing of bore and rod surfaces. It can be made in sizes for all slush pump stuffing boxes. See it at your field store. Look for countercard display with actual sample attached. Or write Johns-Manville, Box 14, New York 16, N.Y. In Canada, Port Credit, Ontario.

Derrick man Lanis J. Breaux installs Wildcat Packing on the Ideal (National Supply Company) S-935 pump.

JOHNS-MANVILLE PRODUCTS

JOHNS-MANVILLE Packings and Gaskets

'RUSS MASTER' SAYS . . .

KNOCK OUT RUST WITH THIS 1-2 PUNCH!

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RUSTMASTER SYSTEM

Ask for details and specifications.

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PIPELINE PATROL

It was not used strictly as a leak-locating method, but in this instance the soil-potential survey did point out areas where trouble could be expected.

Short course studies Offshore problems

PROBLEMS of offshore pipeline construction were tackled recently at the twelfth annual Short Course in Gas Technology at Texas A. & I. College. Some answers were produced by a panel of Warren T. Bulla, Natural Gas Pipeline Co. of America, moderator; Ed Minor, Brown & Root, Inc.; C. W. Hollenshead, United Gas Pipe Line Co.; R. C. Ledford, Marine Gathering Co.; and B. B. McCurdy, Tennessee Gas Transmission Co.

The weather permits operations about 75 per cent of the time from May 1 to October 1, and this time decreases to 25 per cent during December and January.

The deeper the water, the tougher the job. Pipe is generally laid by the stovepipe method. A joint at a time is added on the lay barge and as the barge is moved, the pipe is allowed to sink gradually to the bottom. A stress arc is set up depending on the angle between the pipe on the bottom and the pipe as it leaves the barge. Pontoon arrangements ease strain on pipe between barge and bottom.

Some operators feel a line should be buried at least 18 in. as protection against marine life which attacks concrete coatings. Others like a 6 to 10-ft. trench, which is expensive. The 10-ft. depth won't be safe from a 10,000-lb. anchor dropped from an ocean-going vessel. But 50-ft. water depths will be entered by such ships only when they're in distress.

Hurricane action is not reflected so much in wave action as in mud action on the bottom of the gulf. In shallow water the actual bottom is exposed near the "eye" of a hurricane. The bottom is acted upon by a "mud wave" which damages pipelines. A 10-ft. trench would do little good under these conditions. Corps of Engineer specifications call for a pipeline cover of 3 ft. to a 15-ft. water depth. The trend is for operators to hold to this and then use the 18-in. cover on out.

Tying onto existing lines can be simplified by installing valves on the bottom. These can be lined up by triangulation and located later. The valves can be spotted on the line to accommodate expected future tie-ons.

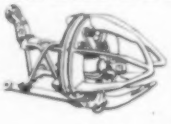
stationary cleaning & priming machine

line traveling coating & wrapping machine

pipeline cradles

stationary coating & wrapping machine

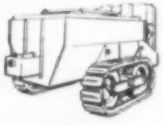
ditch padder



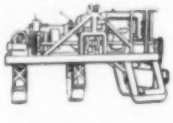
internal line up clamp

pipe cutting & beveling machine

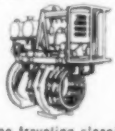
Cinch hydraulic pipe bending machine



pipeline kettles

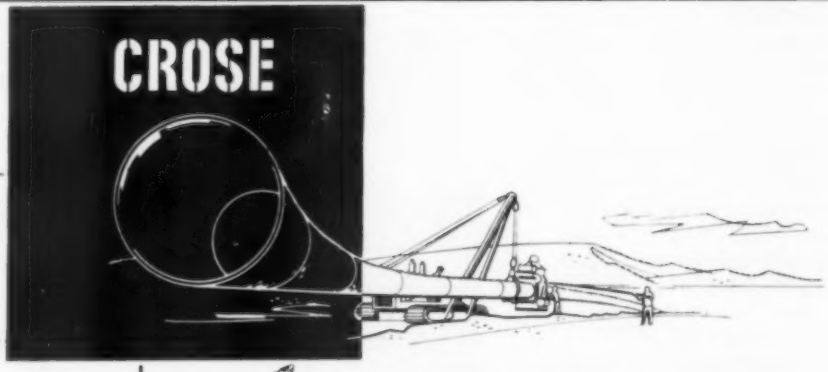


road boring machine



line traveling cleaning & priming machine

CROSE



A COMPLETE EQUIPMENT LINE FOR PIPELINE CONSTRUCTION

The world-wide pipeline construction industry looks to Crose for the most complete line of equipment. Industry experience has proved that Crose equipment is outstanding for efficiency, operating economy—and it is always closer to work in progress because of our many strategic supply points.

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This is a city council meeting in Jefferson City, capital of Missouri. What's going on? Well, Council President Harvey Hager, first on the left, has just received an award for serving his friends and neighbors for 16 years—no, not as a city council member, but as a Standard Oil dealer. Helping him celebrate the award from Standard Oil for his success as an independent businessman are Mayor Arthur W. Ellis, second from left, Councilwoman Gladys Fisher and Councilman Robert E. Dorr.

How 2500 small businessmen won success!

What does it take to be successful in the keenly competitive business world of today?

Well, let 2,500 small, independent businessmen who found success in something they liked and stayed with tell you how they did it. They are all in the same business—all Standard Oil dealers for *15 to 20 years* or more. Since their business is one of the most competitive in the world, they speak with particular authority.

Here is their formula for success, and it applies to many other businesses as well—friendliness, helpfulness and efficient service. PLUS one other vitally important factor—high quality, always dependable products—products they are proud to sell to friends and neighbors.

One other thing. Their friendliness and helpfulness have never been confined to business alone. Of these 2,500 veteran businessmen, hundreds have served as mayors of their towns, as city councilmen, and in Red Cross, Boy Scout, Community Fund or some other community activity.

Just recently we at Standard Oil proudly presented plaques to these 2,500 successful small businessmen throughout mid-America. Now we are looking forward to the time when the 15-year mark will be reached by many more of our 16,000 dealers who are winning success as independent businessmen with their friendliness, efficiency and dependability.

*** What makes a company a good citizen?**

Well, one gauge is a company's contribution to the economic stability of the communities in which it "lives" and "works". Business policies and practices that help other businessmen to grow and prosper are important steps in achieving that goal.

16 years as a Standard Oil dealer. H. E. Frizzell of Billings, Montana, says: "Small, independent businessmen like myself couldn't succeed in the oil business without the aid of a big company. For example, drilling for oil may cost up to a million dollars—and the well may be bone dry. Only big companies can take such risks."

31 years as a Standard Oil dealer. R. H. Salmonson of Ortonville, Minnesota, says: "I couldn't begin to duplicate the equipment that makes up a modern refinery—even on a small scale. Today it takes millions of dollars to refine gasoline. Without a company like Standard Oil behind me, I couldn't be in business for myself."

23 years as a Standard Oil dealer. Ezra Marquie of Kankakee, Illinois, says: "There's more to the oil business than finding oil and selling it. Standard Oil, for example, invests millions annually in research to improve the products I sell and keep me ahead of competition. That's one of the big reasons my business keeps growing."

STANDARD OIL COMPANY (INDIANA) STANDARD

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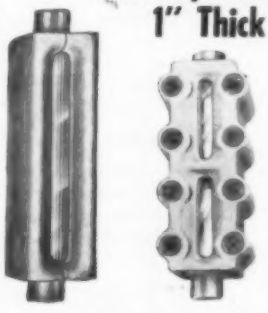

Gage glass in Inferno gages is 1" thick, specially tempered and heat treated. This glass is held in the gage by equal pressures on both sides around the entire edge of the glass. The body is machined from solid bar stock. Write for Bulletin No. 33.

THE INFERNO CO.
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Among the Drilling Contractors

Rank Drilling Contracts Let In Southern Denver Basin

Cox Drilling Co. has been awarded contracts for three significant wildcats in the southern part of the Denver basin. Two of the tests are to be drilled in Elbert County, the other in El Paso County.

The wells are Jeff Hawks et al 1 Taylor in C SE NE 30-9s-61w, 12 miles southeast of the town of Kiowa in Elbert County, 20 miles south of the southernmost production in the Denver basin at Bradbury field; and Jeff Hawks et al 1 State in C NE SW 36-10s-62w.

Cox will also drill a wildcat for Jeff Hawks et al at 1 Tipton in El Paso County, 18 miles south of the 1 State wildcat and 35 miles east of Colorado Springs in C SW NW 23-13s-61w. No drilling depths have been announced.

This new wildcatting is part of a rather large drilling program in this portion of the Denver basin. All wildcats are well south of basin production and just north and west of the Las Animas arch which separates the Denver basin from the northwestern end of the Anadarko basin.

Glasscock-Wilson, Inc., Shreveport, will drill a deep wildcat test in southwestern Avoyelles Parish, East Central Louisiana, as contractor for Southland Royalty Co. Location, at 1 Kavanaugh, in 1-2s-3e, is about 4 miles east of Eola field. The middle Wilcox is the objective.

Wilson Drilling Co., Jackson, Miss., is drilling for John S. Callon and D. A. Biglane at a wildcat location 2¾ miles west of Sunnyside field, in Jefferson County, South Mississippi. The test, 2-D Armstrong, in 37-8n-1w, is projected to the Wilcox about 6,250 ft.

Harry L. Edwards Drilling Co., Houston, has contracted for a 13,000-ft. test at Grand Chenier, in Cameron Parish, southwestern Louisiana. Drilling of this test, which will be for Fifteen Oil Co., marks a resumption of work in this deep gas-condensate area. Location is on Fifteen's Sturlese lease, in 12-15s-5w.

Western Drilling Co. is under way on a 4,700-ft. well northwest of Tow Creek field, 14 miles west of Steamboat Springs, in Routt County, northwestern Colorado. It is a contract job for Cabeen Exploration Co. at 1 Fitch, in 6-6n-86w.

Eagle Drilling & Development Co., Natchez, Miss., is taking on another Wilcox wildcat test in Adams County, southwestern Mississippi. This is for Norman Germany and G. W. Gulmon, whose location is about a mile southeast of Laurel Hill field. Contract is for 6,800 ft. Spot is for 1 Bulter, in 15-5n-3w.

S. & S. Drilling Co. will be the contractor on a rank wildcat test Marshall R. Young, of Brookhaven, Miss., has scheduled for Scott County, in Central Mississippi. It will be a 5,500-ft. test at 1 Denkman, in 12-8n-5e. Location is southwest of Ludlow, in the northwestern corner of the county.

Fortenberry Drilling Co., Natchez, Miss., has a new contract job in northern Wilkinson County, southwestern Mississippi. It is 6,800-ft. Wilcox test for Norman Germany and G. W. Gulmon at 1-B U.S.A.-Newman, in 4-4n-1w. Location is about a mile from production in Kelly Hill field.

Exploration Drilling Co., Tulsa, is getting well down on a new contract operation for British-American Oil Producing Co. in the Cedar Mesa area, 18 miles northwest of Mexican Hat, in San Juan County, southeastern Utah. This is a wildcat location on federal land in 4-39s-18e.

Crow Drilling & Producing Co., Shreveport, will drill a 5,000-ft. Wilcox wildcat for Durbin Bond & Co., Inc. at 1 Tensas Delta Land-Monaghan Land Co. in C SW SW 32-9n-7e, 2½ miles northeast of Tew Lake field in Catahoula Parish, eastern Louisiana. The wildcat is about 4⅜ miles southeast of Harrisonburg.

Milton Crow, Inc., Shreveport, has contract for a 7,500-ft. wildcat 2 miles west of Waldo in Columbia County, South Arkansas for Ross Production Co. et al. The Smackover test, the 1 Keith, will be drilled in SW SW 12-16s-22w, on a block of 1,000 acres assembled by William J. Nesbitt. Good subsurface information is reported in this area by three dry holes in the ¾-mile radius from the 1 Keith.

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Kern Drilling Co., Magnolia, Ark., has a Cotton Valley contract for Petroleum, Inc.'s 1 Calion Lumber Co., Inc., a 3,500-ft. test in Calhoun County, South Arkansas, 2 miles northeast of Snow Hill field. Location is in 14-15s-15w.

Woolf & Magee, Shreveport, will drill a 8,400-ft. wildcat to the Tuscaloosa sands for Biglane, Laub, and Henderson. The 1 Hayes et al will be located in 17-9n-9e, Catahoula Parish, eastern Louisiana, about 2¾ miles northwest of Clayton in the east fringe of the parish. Woolf & Magee also reports it has contract for a 4,500-ft. Wilcox wildcat for Nebo Oil Co., Inc., in LaSalle Parish, east-central Louisiana. The 93 Nebo fee will go down 1½ miles west of Nebo-Hemphill field and 7 miles southwest of Jena.

Sierra Petroleum Co. has contract and is below 3,200 ft. at Panhandle Eastern Pipeline Co.'s Ol Dumler in NE NE SW 7-17-26, Ness County, Kansas. The wildcat is located 3½ miles southwest of the town of Utica and is 4 miles northeast of Kansada field. The well is scheduled for the 5,000-ft. mark.

McDonald Drilling Co. has contract for a 5,000-ft. Entrada wildcat test for Tennessee Gas Transmission Co. at 1 Teter in SW SE NW 11-8s-76w, Park County, Colorado. Location is 13 miles northeast of Fairplay.

R. C. Pierce will drill a Frontier test for Pierce, Nisson & Decker at 1 Brinkerhoff in C SE Lot 74, 6-52n-93w, Big Horn County, Wyoming. Location is in the Greybull field area. Drilling is under way below 716 ft.

Glasscock - Wilson Drilling Co., Shreveport, will be contractor for Aluminium Co. of America 1 Mrs. Jane H Schwing et al, an Iberville Parish wildcat in South Louisiana. Projected depth will be to the Discorbis "D" pay. Location is 43-8s-11e. Nearest production is at Bayou Choctaw field, 4 miles southeast.

Glasscock-Wilson will also drill for Shoreline Drilling Co., Inc., at 1 Maurice Mayer et al, a Jefferson Davis Parish wildcat in South Louisiana. Location for this 7,200-ft. Topsy field test is 29-7s-7w.

Tex and Morris Drilling Co. is handling contract for a 4,500-ft. rotary test 1½ miles northeast of Wellmanville field and 5 miles southeast of the town of Bazine in 26-19-21, Ness County, Kansas. The well is the 1 Antenen in SW SW NW for Aurora Gasoline Co. of Oklahoma City.

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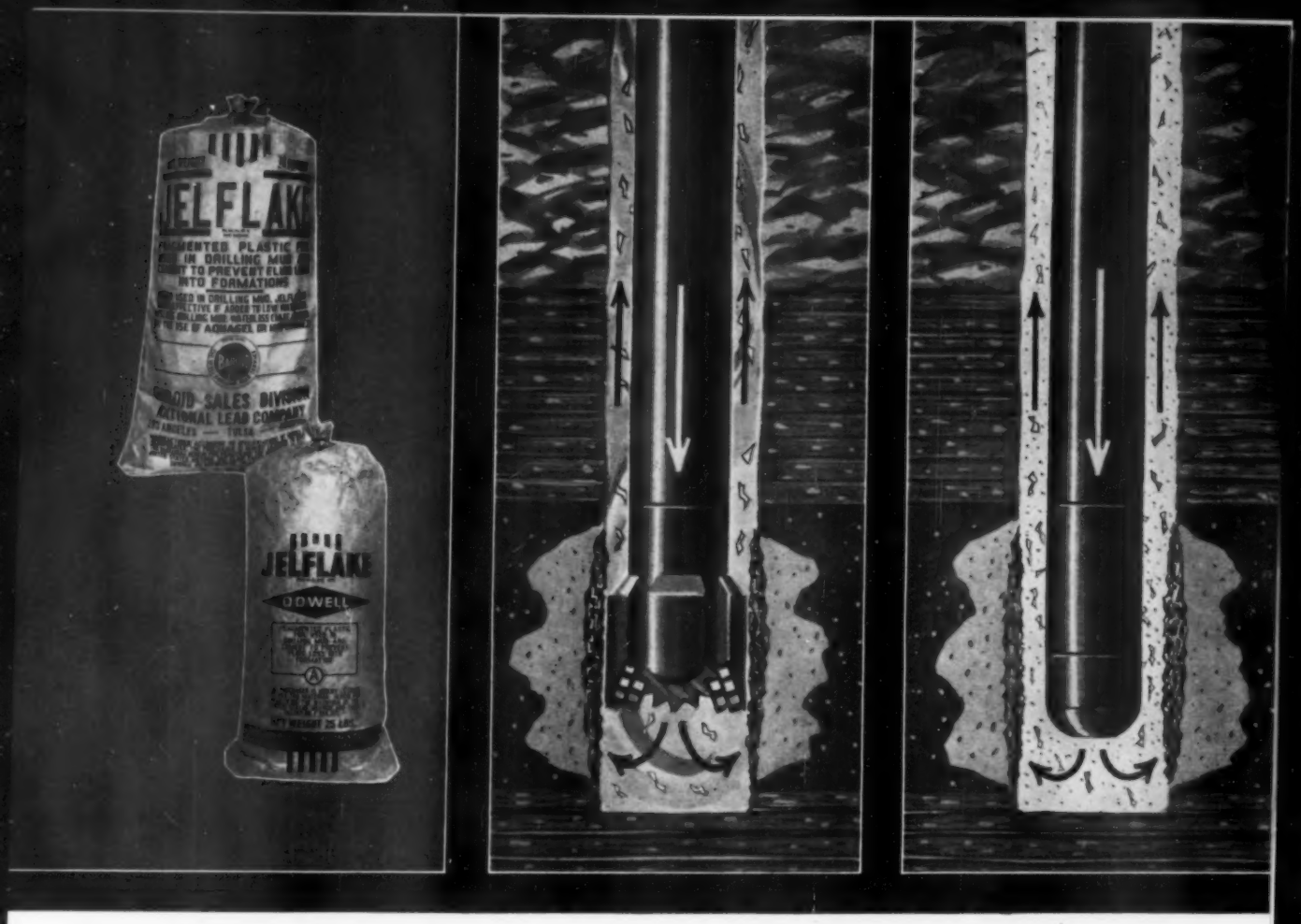

JELFLAKE works equally well in preventing mud or cement loss

Many methods of stopping lost circulation have been tried. Jelflake®, Dowell's fragmented plastic foil, is one of the most successful yet. According to hundreds of field reports, Jelflake provides a fast, effective shut off with a minimum of fluid loss in both drilling and cementing operations.

Jelflake is scientifically graded into a variety of sizes: the smaller flakes provide deep penetration of thief zones, giving a plugging action. The larger fragments both plug and spread out on the wall of the hole, giving a combined plastering and sealing effect to stop fluid loss.

Many unexpected mud losses can be corrected immediately with five pounds of Jelflake per barrel of mud. It can be used in any combination with native or bentonitic muds without destroying the wall-building properties of the fluid. Jelflake is not affected by mud, acid, oil, water, bacteria, or high bottom-hole temperatures.

During cementing operations, Jelflake is effective in preventing slurry losses into highly permeable formations. On the other hand, it does not keep the cement from forming a good bond with the casing or the wall of the hole. In fact, Jelflake-laden cement slurry has been used to plug holes in pipe.

Experienced operators keep Jelflake on hand at all times. They even use it to condition mud before drilling through suspected thief zones. Try Jelflake. Order a supply *before* you begin drilling or cementing operations. Avoid possible loss of time later. It is available at major mud distributors everywhere, or through any of the 165 Dowell offices in the United States and Canada. In Venezuela, contact United Oilwell Service. Or write to Dowell Incorporated, Tulsa 1, Oklahoma.

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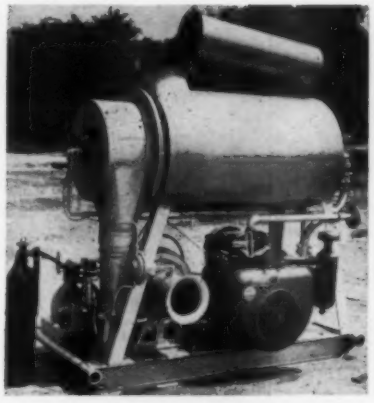
SHOWCASE...

NEW EQUIPMENT



Hot-Oil Heater Controls Output Temperature

The 25-M Texheater shown here is designed to heat crude in flow line, storage, or pipeline systems. Its applications include the recycling of tank bottoms, removing paraffin from downhole and surface equipment, heater-treater installations, or heating of pipelines, water, and heavy crudes, the maker points out. The unit is also applicable in downhole thermal-production programs.

With a rated output of 2.5 million B.t.u. per hour, the unit reportedly will circulate 70 bbl. per hour of crude with the standard positive-displacement oil pump. A precision limit control regulates the output oil temperature.

The unit can be fueled with a wide range of refined products. Or it will efficiently burn most wellhead crudes, except asphalt-base or those heavily contaminated with sulfur, the maker says.

The skid-mounted unit's net weight is 2,680 lb. The base dimension is 36¾ by 83 in., and the over-all height is 65 in.

The safety equipment consists of a built-in quenching ring and a pressure switch which will automatically stop the prime mover upon release of carbon dioxide. A temperature-limit control, an integral part of the coil system, automatically cuts the fire if the coils become fluid starved or if the temperature exceeds a safe operating range. **Write or call: Texsteam Corp., 320 Hughes Street, Houston, Tex., for details on 25-M Texheater.**

Portable Microwave Quickly Installed

The equipment shown here comprises a portable microwave communications system. Designated as MX-641 and designed in France, the equipment can be put into operation at an emergency location in 5 minutes or less to bridge breaks in wire lines with up to 12 telephone circuits, according to the claims of the manufacturer.

Weighing less than 46 lb. per unit, the system has an antenna that mounts on a quickly elevated pneumatic mast operated by a foot pump. It can also be strapped to a tree or telephone pole.

According to company officials, the MX-641 meets the technical requirements of the Federal Communications Commission. It's expected to be particularly useful for the petroleum industry and common-carrier communication services. **Write or call: Intercontinental Electronics Corp., 1551 Franklin Ave., Mineola, N. Y., for details on MX-641 microwave system.**

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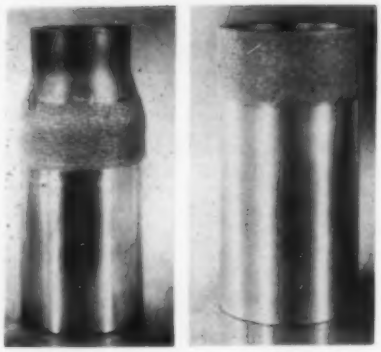
SHOWCASE . . .

New Equipment

Hard-Faced Tool Joint Resists Abrasion



On this double-seal shrink-thread tool joint, Spang hardfacing is now employed. A principal feature cited for the abrasion-resistant hardfacing is uniform distribution of carbide granules. These are imbedded and bonded in the parent metal of the tool joint to form continuous overlapping protective bands, the maker reports. Two grades, banded medium-density (BMD) and banded high-density (BHD) with twice as many tungsten carbide granules as BMD, are available in band widths of 1½ and 3 in.

The tool joints having 3-in. BHD hardfacing are protected from undercutting by three tungsten-carbide pads spaced 120° apart on the 18° elevator shoulder. The hardfacing extends part way down the taper to prevent rapid wear on the shoulder. Sufficient space remains to permit tonging without interference by the hardfacing, according to the maker. **Write or call: National Supply Co., Two Gateway Center, Pittsburgh, Pa., for details on Spang hard-faced tool joints.**

●

Aluminum-Case Gas Meter Reduces Maintenance

This new slow-speed aluminum-case meter, designated as Model AL-250, operates at only seven revolutions per cubic foot. According to the maker, this feature makes the meter capable of sustained accuracy through greater power and slow-speed operation. Such slow-speed operation also minimizes wear at vital bearing points.

Other features listed for the meter include large three-convolution molded diaphragms for use with all fuel gases and die-cast meter connections which minimize galling. Its one-piece aluminum-alloy pressure die-cast body is said to facilitate meter handling and setting and reduce shipping weight.

A high-impact-strength molded-plastic index box gives full index visibility. Other features are oil impregnated porous-bronze bearings and internal grommet seals.

The meter has a rated capacity of 250 cu. ft. per hour of 0.64 sp. gr. gas at ½-in. w.c. differential and 5 psi. rated working pressure. **Write or call: American Meter Co., Inc., 920 Payne Avenue, Erie 6, Pa., for details on Model AL-250 meter.**

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Shield-Arc 85-P, E-7010
Especially designed for vertical down cover passes on pipe, Shield-Arc 85-P operates well in all positions. It is excellent for welding both low-carbon and high-tensile pipe. Is smooth flowing, has high melt-off rate and low slag loss. Operates on DC.

This is a "natural" pair, each custom designed to complement the other's high quality and easy operating characteristics. Both electrodes conform to or surpass A.W.S., and A.S.M.E. specifications. Try these electrodes for better pipe-line welding at lower cost.

Write for Weldirectory SB-1351 for details and specifications.

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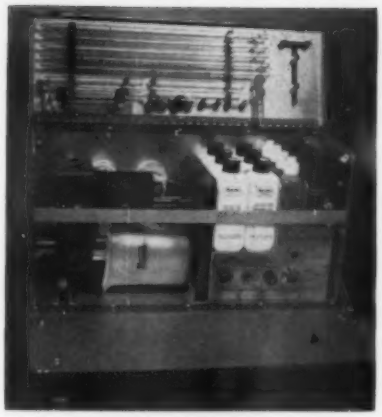


Portable Mud-Testing Kit Designed for Offshore Rigs

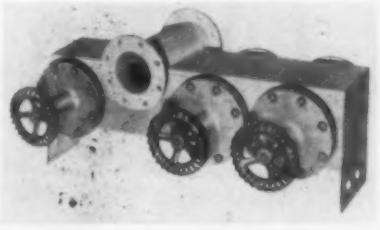
In this new portable kit, all the equipment is contained for determining the physical and chemical properties of drilling mud being used on offshore drilling rigs, the maker reports. The items include both the glassware and chemicals for running pilot tests with various treating agents. Nonbreakable polyethylene containers hold the solutions.

The most important features of the unit, according to the maker, are the viscosimeter, an instrument essential for the measurement of flow properties of mud, and a specially designed power pack built into the kit which converts either 120-volt a.c. or d.c. power to the 12 volts needed for operation of the viscosimeter. This last feature eliminates the necessity for transporting a heavy storage battery.

Complete with the viscosimeter, power pack, and other testing equipment, the offshore kit weighs 21 lb. It's anodized to prevent corrosion.

Write or call: Equipment Dept., Magnet Cove Barium Corp., P. O. Box 6504, Houston 5, Tex., for details on offshore mud-testing kit.

●



Manifold Valve Gives Added Safety

Safer transportation and delivery of petroleum products in transport and trailer-truck tanks and safe discharge of split loads may be achieved with this new Wheaton manifold, the company reports. The manifold does not have a frame. All valves have noncorrosive trim and a large through area.

In operation, the manifold permits a high flow rate resulting in fast discharge of the product. The valves can be had in piping arrangements to suit the user's requirements. The manifolds are made in aluminum, steel, and stainless steel, in square, split, and selective models. **Write or call: Wheaton Brass Works, Springfield Road, Union, N. J., for details on manifold valves.**

SHOWCASE . . .

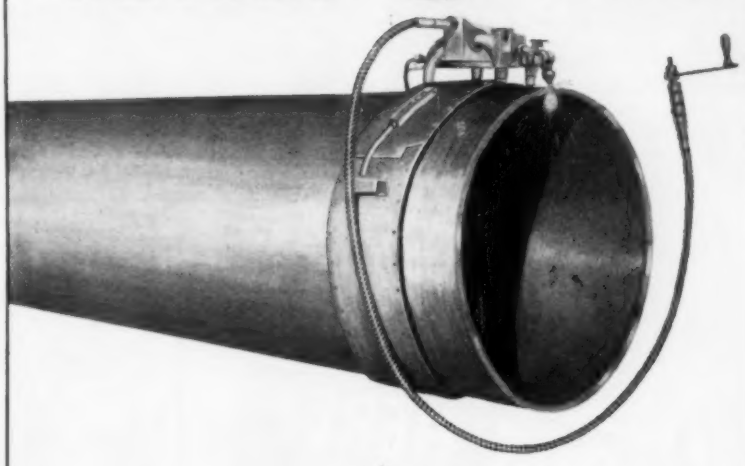
New Equipment

Wall-Cake Remover Permits Better Cementing

Using overlapping coils of oil-tempered spring-steel wire, this new Coil-Flex wall-cake remover for use in well cementing reaches out and makes double contact with every portion of the wall surface, the maker says. Yet it

BEVELS 6" PIPE

BEVELS 48" PIPE



C-R-C IMCO BEVELERS fit all pipe sizes 6" to 48" O. D., cut perfect bevels, and out-of-round pipe, too. Single lightweight unit does work of several, costs you less to buy and use.

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For additional information see page 108, Pipeline Composite Catalog.

The CRC IMCO Pipe Beveling Kit contains a complete range of bands for beveling a variety of pipe sizes. With this convenient selection of sizes, the operator need only make one trip to handle all pipe beveling requirements including back beveling. The sturdy steel case and number of bands are optional.

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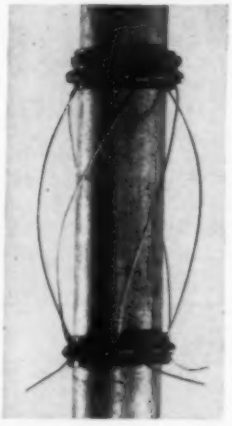
SHOWCASE . . .

New Equipment



does not scratch the wall cake when going into the hole.

Flexing is achieved by drawing up the pipe, causing feelers to engage the wall while the lower collar, attached to the pipe, compresses the coils forcing them outward.

Large openings between the coils reportedly permit mud cuttings and shale to pass freely without clogging. During cementing, the "egg beater" action of the coils maintains cement at a uniform viscosity, increasing the efficiency of the circulating pump, according to the maker. **Write or call: Hub Oil Tool Co., 1112 North Market Street, Shreveport, La., for details on Coil-Flex wall-cake remover.**

●

Bottom-Hole Heater May Up Flow Rate

Here is a new bottom-hole oil-well heater which is said to speed the flow of oil locked in formations by congealed asphalt and paraffin. The heater keeps the asphalt or paraffin in a liquid state by transferring heat from the surface to the bottom-hole forma-

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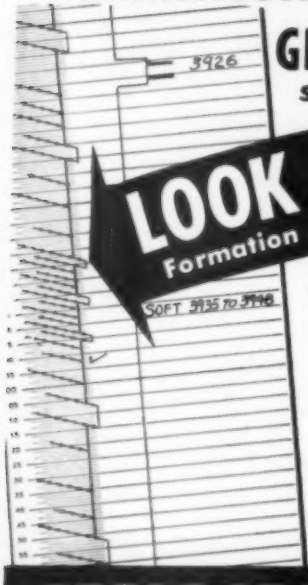

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tions, according to the manufacturer.

It consists of a 15-ft. metal tube containing heating elements and a patented circuit-control panel. The tubing conducts low-frequency current down the well.

Wire connections are used only from the control panel to the wellhead. Polyvinyl No. 6 cables serve as conductors in the heating elements.

Bottom-hole temperatures are maintained automatically at any degree desired, the maker claims. The heater can be used continuously. Or it can be turned on or off at intervals ranging from 15 minutes to 12 hours. **Write or call: Electronic Oil-Well Heater Co., 4109 West Jefferson Blvd., Los Angeles 16, Calif., for details on electronic bottom-hole oil-well heater.**

●

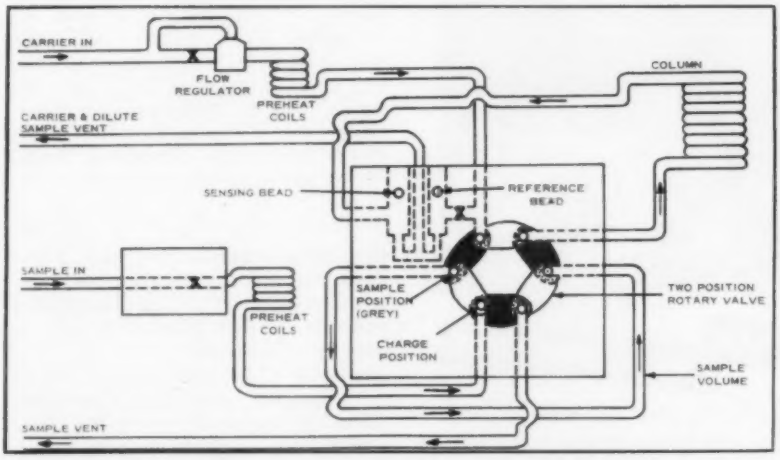
Retrievable Casing Packer Easy to Set, Release

This new Baker Model E retrievable casing packer is particularly suited for water flooding and other operations, according to the maker. Although designed as a setdown packer, it can be used without modification as an upstrain packer.

A J-slot mechanism actuated from the surface is said to make the packer easy to set and release. The smooth pad portion of the slips acts as a drag block to provide necessary friction to operate the setting mechanism.

The packing element is made of synthetic rubber. The bore through the packer is larger than the drift diameter of the tubing so pressure bombs, temperature-recording devices, through-tubing jet perforators, and other equipment can be run through the packer.

Over-all dimensions range from 33 to 37 in. **Write or call: Baker Oil Tools, Inc., Box 2274 Terminal Annex, Los Angeles 54, Calif., for details on Model E packer.**



Vapor Fractometer for Stream Analysis

The schematic diagram above illustrates the new Perkin-Elmer Model 184 industrial vapor fractometer for extending the laboratory gas-chromatography technique to continuous process-steam analysis.

The process-vapor fractometer can be easily set up to perform multicomponent analyses on a wide variety of process streams, the maker says. All components are quickly and easily accessible.

The model 184 consists of three units: (1) an anlyzer, installed in the plant close to the sample take-off point; (2) a programer unit, and (3) a recorder. The last two items are customarily installed in a control room.

The analyzer is enclosed in an explosion-resistant housing conforming to Class I, Group D, Division 1 housing specifications. An upper compartment within the housing provides for thermostatting the sample column, detector, sampling valve, and carrier-gas lines.

The standard model records from one to four components directly on a bar-chart presentation. **Write or call: Perkin-Elmer Corp., Norwalk, Conn., for details on Model 184 vapor fractometer.**

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SHOWCASE . . .

New Literature

Motor-Driven Controlled Volume Pumps. New 32-page Bulletin 553-1 furnishes complete specifications and the latest design features of Milton Roy positive-displacement pumps, designed for precise metering and pumping of corrosive liquids against pressure. The bulletin describes and illustrates both the maker's standard and modified models and their applications. A special feature section contains recommendations for materials selection and usage plus other handy reference information. **Write or call: Milton Roy Co., 1300 East Mermaid Lane, Philadelphia 18, Pa., for Bulletin 553-1.**

●

Check Valve described and illustrated in this new eight-page bulletin, when combined with any standard pipe fitting, forms a complete check valve suitable for a variety of services. The pipe fitting, according to the bulletin, may be of any style—tee, cross, ell, or reducer. Made of stainless steel, the check valve works in any position. The bulletin, with a number of photographs, shows how the valve can be readily installed in piping, tanks, or pressure vessels. **Write or call: Durabla Mfg. Co., 114 Liberty Street, New York, N. Y., for check-valve bulletin.**

●

Submersible Pumps Bulletin 1020 describes Johnston submersible pumps with 4 to 7-in. bowls, horsepower ranges to 20 hp., and capacities of 375 g.p.m. **Write or call: Johnston Pump Co., 3272 East Foothill Blvd., Pasadena 8, Calif., for Bulletin 1020.**

●

Check, Shuttle, Relief, and Shutoff Valves are diagramed and described in this new four-page brochure. It discusses their uses and advantages for general, corrosive, and low-pressure service. One section is devoted to typical O-ring recommendations, and model, material, and connection designations. Schematic drawings show the valves' flow and seal characteristics. **Write or call: James, Pond & Clark, Inc., 2181 East Foothill Blvd., Pasadena 8, Calif., for brochure on check, relief, and shutoff valves.**

●

Short-Coupled Vertical Pumps are the subject of this new six-page, five-color foldout. It explains several uses for the pumps in oil refineries and pipelines and includes suggested installation plans. A cutaway view shows the pumps' interior arrangement. **Write or call: Layne & Bowler, Inc., Box 6697, Hollywood Station, Memphis 8, Tenn., for foldout on vertical pumps.**

●

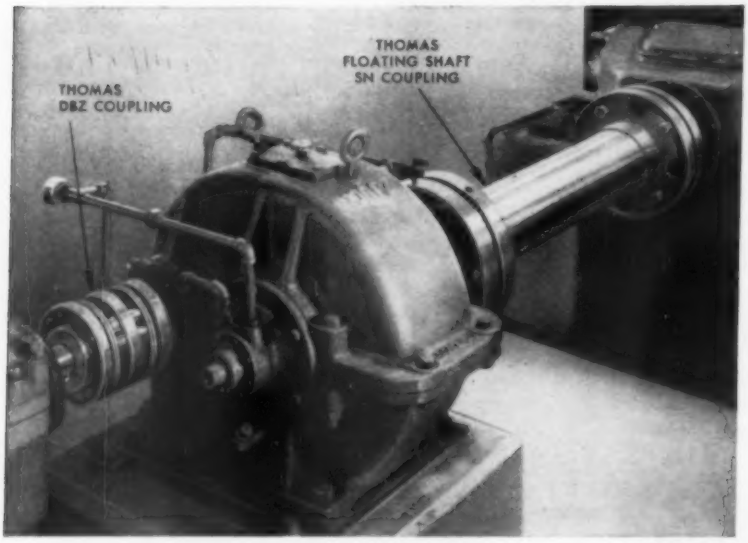
Percolation Adsorptive Processes, a new 24-page technical publication (401) discusses both static and moving-bed processes, particularly in relation to petroleum applications. Of particular interest is a discussion of thermal regeneration and many design equations, including maximum permissible flow rate. The publication devotes a special section to a new patented continuous-percolation process. **Write or call: Minerals & Chemicals Corp. of America, Menlo Park, N. J., for Technical Information 401.**

●

Multistage Centrifugal Pumps. Eight-page, multicolor Bulletin 128 covers Pacific Types A, AC, OV, and UNI multistage centrifugal pumps for high-temperature and high-pressure services. These pumps range in size from 2 to 8 in., maximum speeds to 6,000 r.p.m., capacities to 2,700 g.p.m., maximum temperatures to 850° F., discharge pressures to 2,000 psig., and differen-

THOMAS FLEXIBLE COUPLINGS

Give You Freedom From Coupling Maintenance



NO LUBRICATION NO MAINTENANCE NO WEARING PARTS

Future maintenance costs and shutdowns are eliminated when you install Thomas Flexible Couplings. These all-metal couplings are open for inspection while running.

They will protect your equipment and extend the life of your machines.

Properly installed and operated within rated conditions, Thomas Couplings should last a lifetime.

Under Load and Misalignment only Thomas Flexible Couplings offer all these advantages:

1 Freedom from Backlash Torsional Rigidity
2 Free End Float
3 Smooth Continuous Drive with Constant Rotational Velocity
4 Visual Inspection While in Operation
5 Original Balance for Life
6 No Lubrication
7 No Wearing Parts
8 No Maintenance

Write for Engineering Catalog 51A

THOMAS FLEXIBLE COUPLING COMPANY
WARREN, PENNSYLVANIA, U.S.A.

tial heads to 4,500 ft. The bulletin also contains cross-sectional drawings of each type of pump. **Write or call: Pacific Pumps, Inc., 5715 Bickett Street, Huntington Park, Calif., for Bulletin 128.**

●

Centrifugal Pump Bulletin 121-A describes a single-stage, single-inlet centrifugal pump with a capacity range of 15 to 1,300 g.p.m. for discharge pressure to 600 psi., inlet pressures to 350 psi., differential head to 650 ft., temperature to 300° F., and speeds up to 3,600 r.p.m. The new bulletin furnishes a five-color cutaway drawing of the pump showing its design features. Describing the pump's design and materials of construction, the bulletin also contains dimensional drawings and tables and a pump-size selection chart. **Write or call: Pacific Pumps, Inc., 5715 Bickett Street, Huntington Park, Calif., for Bulletins 137 and 121-A.**

●

Chain Block Safety Chart. This new wall-type safety chart illustrates how to do safe handling with chain blocks. Nine illustrations show both the right and wrong ways to safely operate and maintain blocks. Keyed to the illustrations is a large cutaway view of a typical block showing the working parts. **Write or call: Manning, Maxwell & Moore, Inc., Shaw Box Crane & Hoist Division, Muskegon, Mich., for "Chain Block Safety Chart."**

●

Propeller Fans. Revised Bulletin A-109C (32 pages) covering Hartzell propeller fans contains new fan sizes, revised air deliveries, specifications, performance data, and dimensional drawings on the entire line. The bulletin shows standard propeller, utility, cool-blast, reversible and bypass duct fans, intake air units and unit heaters. **Write or call: Hartzell Propeller Fan Co., Piqua, Ohio, for Bulletin A-109C.**

●

Pipeline Equipment. Eight-page Folder CR-546-G shows the use of International crawler tractors on pipeline-construction projects. On-the-job photos show side-boom-equipped rigs stringing pipe; feeding a bending machine; cradling pipe for cleaning-priming, wrapping, and welding crews; and lowering in. Other photos show the crawlers equipped with a dozer blade for clearing right-of-way and cleanup work, with a skid-shovel for backfilling, and with a winch for towing bogged-down units such as shovels, pipe-stringing trucks, welding trucks, sleds, and bending machines. **Write or call: Construction Equipment Div., International Harvester Co., 180 North Michigan Avenue, Chicago 1, Ill., for Folder CR-546-G.**

●

Remote-Reading Tank Gage. Four-page Bulletin 571 details the construction and operation of the Oceco No. 30 tank gage, a completely automatic gage readily adapted to remote readings. Diagrams illustrate the proper methods of installing the gage. The bulletin also pictures and describes circular, foam glass, and raft-type floats used with the gages. **Write or call: Johnston & Jennings Co., 6917 Bessemer Avenue, Cleveland 27, Ohio, for Bulletin 571.**

●

Adjustable-Angle Dial Thermometer Bulletin AAD-57, a two-page data sheet, describing the Weksler mercury, liquid, gas, or vapor-pressure-actuated adjustable-angle dial thermometer available in sizes from 3½ to 8½ in. for a variety of Fahrenheit or Centrigrade temperature ranges. **Write or call: Weksler Thermometer Corp., Freeport, N. Y., for Data Sheet AAD-57.**

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TOOL JOINT COMPOUND

Competitively Priced...

Designed for normal and heavy oil-country service..."#9" Tool Joint Compound combines the *superior qualities* of JET-LUBE formulation... yet is competitively priced to inexpensive tool joint dopes. Contains ample *anti-seize* and *low-friction* metallic ingredients

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JET-LUBE #9 *sticks* to wet joints.. tenacious to metal. *Protects* against salt water and corrosion. *Withstands* excessive hole pressures and temperatures. *Preserves* thread life.

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EQUIPMENT MEN . . . in the News

American Right of Way to Discuss National Seminar

Fred Crane, president of the American Right of Way Association, Chapter 5, has requested that all members be present during their October 11 meeting at Kansas City. Discussion on whether or not Chapter 5 will sponsor the 1959 National Seminar will be held during the session.

Tretolite Transfers Jenkins to The Hague

Frederick E. C. Jenkins has been transferred from St. Louis to The Hague by Tretolite Co., division of Petrolite Corp. Jenkins has been assistant manager of technical services. In his new position he will be affiliated with the European division of Petrolite Corp., Petrolite, Ltd. He will serve as technical service engineer, specializing in the applications of Tret-O-Lite demulsifiers and Kontol corrosion inhibitors throughout Europe and the Middle East.

Jenkins has been with the Petrolite organization since 1953.

Stewarts & Lloyds Plans Increased Tube Production

Stewarts & Lloyds, Ltd., and John Summers & Sons, Ltd., have made a preliminary arrangement whereby hot rolled steel strip will be supplied by John Summers to an electric resistance weld tube plant to be installed by Stewarts & Lloyds adjacent to John Summers' works at Shotton, near Chester, England.

The tubes to be produced will be 6⅝ to 16 in. o.d. and are intended mainly for export to the oil industry. The tube plant to be erected by Stewarts & Lloyds is expected to go into production early in 1960.

Atlas Valve Names North New Jersey Representative

Robert H. White has been named sales representative for Atlas Valve Co.'s northern New Jersey territory, according to Verner Davis, president. White will headquarter at the Atlas plant in Newark, N. J. He comes to Atlas from American Viscose Corp. where he was power plant engineer. Prior to that he was superintendent of generation for Ebasco International in Panama.

BJ Tools Moves Canadian Head Office to Calgary

Byron Jackson Tools, Inc., a subsidiary of Borg-Warner Corp., has moved its Canadian headquarters from Edmonton to Calgary, according to V. C. Horner, vice president and manager of sales.

BJ will continue to maintain an Edmonton office but major dominion policy will stem from Calgary. A large inventory is warehoused in Edmonton to provide greater service for oil companies operating in that area.

Arch Boyd, formerly district manager in Edmonton, will head the new Calgary operation. Lew Minkler will remain in charge at Edmonton.

Three New Store Managers Named by Mid-Continent

J. D. GILMER

New store manager of Mid-Continent Supply Co.'s Great Bend, Kans., store is J. D. Gilmer, former city salesman there. Assuming new duties as store manager at Eunice, N. M., is F. C. Stickney, former field salesman at Hobbs. A. M. Thompson, former field salesman at Citronelle, Ala., is Mid-Continent's new Laurel, Miss., store manager. These appointments were announced by President Ken W. Davis.

F. C. STICKNEY

A. M. THOMPSON

Gilmer joined Mid-Continent in 1950, Stickney in 1949 and Thompson has been with Mid-Continent 9 years.

Doré Expansion Will Add Plant, Office Facilities

John L. Doré, president of John L. Doré Co., Houston, and R. E. (Bob) Smith, Houston business executive, have announced a $250,000 expansion program which will double facilities of the Doré company and its affiliated firms.

When completed, the program will have added 9,000 sq. ft. of plant and 1,000 sq. ft. of office space. Additional facilities also will be provided for Doré Linings, Inc., producers of Teflon-lined steel pipe and fittings, extruded and molded nylon and other thermoplastics, and John L. Doré Co., the sales organization.

Other Doré personnel are Vivian Leatherberry Smith, vice president; J. S. Bawcom, vice president and general manager; L. L. Elliott, secretary; W. L. Petrosky, manager of John L. Doré, Inc.; Harry I. Thompson, Jr., sales manager, John L. Doré Co.; and B. R. Murphree, manager of Doré Linings, Inc. L. H. Calahan has been ap-

Crose Export Reps Inspect Typical Daily Shipment

John Manley, M. J. Crose Manufacturing Co., Inc., export sales manager (left) shows newly manufactured equipment to New York export representative D. T. O'Connor and his assistant, Burton J. Matteson, Jr. This shipment, made at the Crose plant in Tulsa, is destined for Kuwait and includes new Crose cradles and internal lineup clamps to handle pipe 36 to 42 in. in diameter.

ACCO for Better Values

R-P&C Valves

DESIGNED FOR DEPENDABILITY

Fig. 1-A, rated for 150 lbs., has special asbestos composition disc for tight shutoff

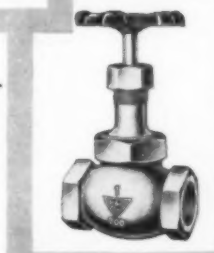


Fig. 409, rated for 200 lbs., has integral high test bronze seat for easy regrinding

Fig 033 Angle Valve, rated for 125 lbs., has integral seat, re-grinding type disc

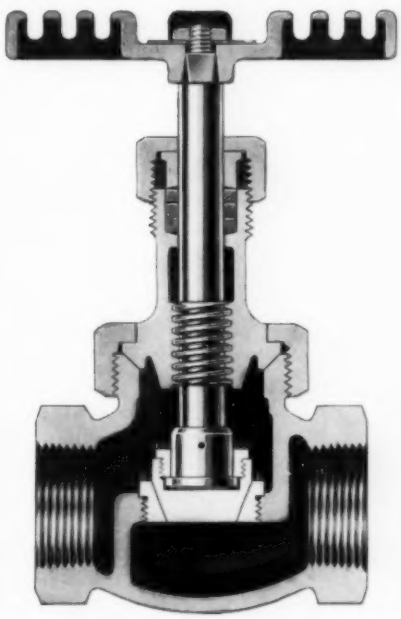


Fig. 427-DP Bronze Globe Valve

R-P&C Distributors offer 9 different models of Bronze Globe Valves—What are your requirements?

• You can select the R-P&C globe or angle valve to meet your particular requirements from a wide variety of seat and disc constructions, with union or screwed bonnet, screwed ends, in pressure classes from 125 to 300 pounds. Your R-P&C distributor offers 9 different bronze globe valves, each in a complete range of sizes—and 8 different models of angle valves which duplicate the construction features found in the globe valve line.

For example, if your application calls for frequent or continuous throttling in steam, water, oil or gas service, the **Fig. 427-DP** shown above is probably your best bet. The full plug construction gives you closer regulation. And the 500 Brinell stainless steel seat and disc resist wire drawing—give you much longer valve life.

Your R-P&C distributor can recommend the specific valve to answer your particular problem. And he has an equally wide selection in R-P&C's complete line of angle, gate and check valves in iron and cast steel, as well as forged steel gate valves. See him today.

Send for this free wall chart

"How to Protect Your Valves"

• 22 in. x 17 in. wall chart tells how to protect valves, get longer valve life—gives installation and operation pointers. Write for your copy.

R-P&C Valve Division

AMERICAN CHAIN & CABLE

Reading, Pa., Atlanta, Boston, Chicago, Denver, Detroit, Houston, New York, Philadelphia, Pittsburgh, San Francisco, Bridgeport, Conn.

ACCO

TRADE MARK

No. 1 in a series . . . Reed Rock Bit **Firsts** in Famous Fields

Reed Rock Bits

BEST IN 1919
BEST TODAY!

Reed introduced the *first* rotary rock bit equipped with four cutters which rolled on bottom in 1917, and by 1919 this original cross roller bit had set new records for fast and economical drilling in rock. Reed's popular cross roller rock bits were used extensively in the fast development of Gulf Coast fields following World War I.

By 1919 much of the drilling activity was devoted to extending existing fields and developing new commercial horizons within these fields. Some of the fields with extensive drilling operations during this period were West Columbia in Brazoria County, Goosecreek and Humble in Harris County, Barbers Hill in Chambers County, Blue Ridge in Ft. Bend County, and Hull in Liberty County.

Also in 1919, the small but ambitious partnership that had produced the first successful cross roller rock bit became a corporation. From their first plant in a small 30x40-foot rented building on Harrisburg Boulevard, Reed purchased and moved to a 28-acre tract on Navigation Boulevard which is covered today with the most modern oil tool research and manufacturing facilities. Just as Reed cross roller rock bits were synonomous with drilling progress in 1919 . . . Reed Y Bits lead in drilling efficiency *today* with increased penetration rates . . . increased footage per bit . . . and increased dependability.

BEST IN 1919 . . .

The Original Reed Cross Roller Rock Bit

BEST TODAY . . .

REED Y BIT

FREE REPRINT

This is the first of a series of four paintings on the history of famous oil fields. To obtain your FREE 17 x 14" full color prints suitable for framing of the entire series, send your request to Department H, Reed Roller Bit Company.

GULF COAST · 1919 Rig floor scene in the Goose-creek, Harris County, field. Note the exposed chain drive to the rotary, single band drawworks and wooden derrick.

REED ROLLER BIT COMPANY

HOUSTON 1, TEXAS

7273

This ***D-SANDER*** has proved its value in these two important areas.

GULF COAST

The Dorrco D-Sander was originally developed to remove abrasive sands prevalent in Gulf Coast drilling down to about 9,000 feet. It has worked so well that it is rapidly becoming standard equipment on many Gulf Coast rigs.

On one series of controlled tests, for example, savings in overall drilling costs averaged more than $5,000 per well. Faster drilling rates, reduced pump repair costs and more footage per bit contributed to this saving.

MID-CONTINENT

In North Texas and Oklahoma, build-up of fine drilled solids were increasing viscosity and weight of the drilling fluid and reducing drilling rates.

SWACO Engineers set the D-Sander to remove all drilled solids above 30 microns in size and results were astounding. Drilling rates increased as much as 15 per cent. Bit footage increased as much as 25 per cent and mud control was greatly simplified. Important cost savings were realized.

Regardless of where you drill, the Dorrco D-Sander may save you money by maintaining a low solids, low weight, non-abrasive drilling fluid. For full information, call us.

SWACO

SALT WATER CONTROL Inc.

A Sid Richardson Development Company

1211 Ft. Worth National Bank Phone: ED 2-4434 Ft. Worth, Texas

pointed district sales manager of John L. Doré Co.'s newly formed northeastern section with offices in New York City. District offices are also maintained in Glendale, Calif., Baton Rouge, La., and Dallas.

Two Coatings Executives Named by Pittsburgh Coke

Norman T. Shideler has been elected president of Insul-Mastic, Inc., Pittsburgh Coke & Chemical Co.'s newly acquired subsidiary producing for the protective coatings division, while Arthur E. Gray was named to succeed Shideler as the division's general manager.

Shideler will also act as technical adviser to the vice president, chemical division, with regard to all industrial protective coatings and tar products of

N. T. SHIDELER

A. E. GRAY

Pittsburgh Coke. He will be responsible for all coatings research and development for the new subsidiary. Gray will be responsible for management of the division which will now market the gilsonite-asphalt mastics in addition to the division's tar base coatings.

Shideler joined Pittsburgh Coke in 1948 as chief of production research and development. Gray joined the company in 1952 as assistant manager of the protective coatings division, becoming sales manager in 1953.

Du Pont Opens Warehouse To Serve Pacific Northwest

New warehouse facilities have been established by Du Pont's petroleum chemicals division at Mount Vernon, Wash., to provide faster, better service to users of its petroleum additives in the Pacific Northwest.

All types of Du Pont's gasoline dyes, gasoline antioxidants, metal deactivators, fuel oil additives, and grease antioxidants will be stocked at the new facilities, which supplement those already in operation at Los Angeles, Chicago, Kansas City, Mo., Houston, and Billings, Mont. Tetraethyl lead will continue to be warehoused for the West Coast in Los Angeles, with specialized service to Northwest refineries from the company's tank car warehouse-on-wheels at Ferndale, Wash.

Foreign Personnel Are Guests of Houston Nomads

Foreign guests attending a recent meeting of the Houston Chapter of Nomads were: (front row) E. S. Hulsman, Shell Oil Co., Bogata, Colombia; J. T. Johnson, Creole Petroleum Corp., Maracaibo, Venezuela; Chester H. Lauck, Continental Oil Co., Houston. Back row: R. R. Davila, Consul General of Venezuela, Houston; R. Ach, S. N. Marep, Paris, France; R. H. Johnson, Standard Vacuum, Polembang, Sumatra, Indonesia; Oscar Schuberg, Cal Tex, Sumatra, Indonesia.

National Steam Pump Names C. J. Smith as Distributor

C. J. Smith, Tulsa, has been appointed as distributor for National Steam Pump Co. of Upper Sandusky, Ohio.

Smith has been an equipment distributor in the oil industry for the past 25 years.

National Tank Subsidiary Names Scholl, Becker

Don Scholl has been appointed field branch manager with headquarters at National Sales Co.'s new warehouse in

DON SCHOLL

W. BECKER

Bakersfield, Calif., and William Becker has been named district manager of the newly formed California subsidiary of National Tank Co., according to Jay P. Walker, National president.

Scholl joined National Tank Co. at its Longview, Tex., branch in 1945. In 1952 he joined American Pipe & Steel Corp., the distributor of National products in California at that time. He rejoined National with the opening of National Sales Co.

Becker joined National in 1951 at Odessa, Tex., where he served as field engineer for 2 years. Prior to his move to California he has been serving as district engineer in Abilene, Tex.

General offices of National Sales are in the Commercial Building, Los Angeles.

Baash-Ross Names Brenner, Transfers Fred Waller

R. C. (Bob) Brenner has been appointed as Baash-Ross Tool Co.'s Gulf Coast sales manager, with headquarters in Houston. Fred Waller has been transferred from New Orleans to Houston to represent Baash-Ross in the East Texas area.

R. C. BRENNER

Brenner has previously represented Baash-Ross in the Shreveport, Rocky Mountain, Dallas and Houston areas. Waller joined the firm in Houston in 1945.

Welex Appoints Rushmore As Odessa Sales Engineer

Jerry Rushmore has become sales engineer for the Odessa district of Welex, Inc., according to J. B. Vaughan, vice president of sales for the Fort Worth oil well service company.

Rushmore has had 5 years' experience in oil field service work, 4½

years of which have been with Welex, first in the Hobbs district and later in the Pampa district.

FWD Appoints Pernot as Domestic Sales Manager

L. L. PERNOT

Lloyd L. Pernot, director of sales engineering since early this year, has been appointed domestic sales manager of Four Wheel Drive Auto Co., according to G. F. DeCoursin, vice president of sales of the Clintonville, Wis., truck-manufacturing firm.

Pernot, who has been with FWD since 1932, has been in charge of all FWD market specialists and sales correspondence since last January. Prior to that he served 6 years as transport sales manager. He has continued to handle transport market product development. In his new capacity, Pernot will supervise FWD's assistant and district sales managers.

Win-Well Names Graves as Oklahoma Representative

E. L. GRAVES

Ernie Graves Co. of Tulsa has been appointed sales representative for Win-Well Manufacturing Co., Los Angeles, manufacturer of the Win-Well seven-way multiport selector valve, according to William B. Pollock, president of Win-Well.

Head of the Graves company is Ernie L. Graves. Previous to organizing his own company 2 years ago, he was associated with Shell Pipeline Co., Standard Oil of Indiana and Condit Co. Assistant to Graves is C. A. (Chuck) Jurries, who was with J. F. Pritchard & Co. and Condit Co. before joining the Graves company 1 year ago.

Graves also represents J. F. Pritchard & Co. of California, Conoflow Corp., Brooks Rotometer, Weston, Maloney & King Engineering Co.

Parker Promotes Davis

Earl C. Davis has been appointed sales manager of the industrial hydraulics division, Parker Appliance Co., Cleveland, Ohio, according to D. W. Holmes, Parker vice president.

Davis, before joining Parker in 1955, was with Hydreco division of New York Air Brake Co.

Mannesmann Names Hermann Winkhaus

H. WINKHAUS

Dr. - Ing. Hermann Winkhaus recently was appointed president of Mannesmann AG. succeeding Wilhelm Zangen. The two men have worked for several years in close cooperation at the head of the big steel enterprise.

Todd Shipyards to Build Barges for Baroid Division

The products division of Todd Shipyards Corp. has been awarded a contract by Baroid Division, National Lead Co., calling for the construction of 15 deck cargo barges 110 by 30 by 7 ft. Delivery will begin in October. Todd's products division is located in Houston.

Rawson Names Simpson as Manager at Baton Rouge

James H. Simpson, who has had extensive experience in the oil refining, petrochemical and metal fabricating industries, has joined Rawson & Co. as manager of activities in Louisiana, Mississippi and southern Arkansas. His headquarters are in Baton Rouge.

Rawson & Co. is exclusive representative for Brodie petroleum meters, Petro-Chem vertical furnaces, Ducon catalyst cyclones, and other process equipment for the oil refining, pipeline, petrochemical and allied industries. Home offices are in Houston.

Simpson has served with Goodyear Aircraft Corp., Goodyear Synthetic Rubber Corp. and Fisher & Porter Co. as engineering estimator, mechanical engineer, instrument engineer and instrument sales and service engineer prior to opening his own consulting engineering firm in Baton Rouge in 1953.

J&L's Bastian and Weldon Attend Marketing School

A. G. Bastian, manager, field sales division, Jones & Laughlin Supply Division, and V. H. Weldon, Jr., assistant manager, Canadian operations, joined over 300 hand-picked sales and marketing executives participating in

A. G. BASTIAN

V. H. WELDON

the executive development program of the fifth annual Graduate School of Sales Management and Marketing, according to Rainey Elliott, president of J&L. This program is sponsored annually on the campus of Rutgers University by National Sales Executives, Inc. Weldon attended the first 2½ weeks of a 5-week course, while Bastian completed the last 2½ weeks of the same course.

Foreign Guests Attend Meeting of Los Angeles Nomads

Foreign guests shown at a recent meeting of the Los Angeles Chapter of Nomads include: (standing) John D. Carmichael, Mene Grande Oil Co., Venezuela; Jaime Reyes and Robert Blackwood, Empresa Nacional del Petroleo from Chile; M. R. Vollmer, Oil Base, Inc., Colombia; J. W. McClellan, Cal-Tex, Sumatra.

Seated: Marv Williams, I.P.C., Iraq; Leon Duane, Brown International, Turkey; John Alexander, I.P.C., Iraq; B. B. Rodgers, Camdril, Libya.

Wolverine Names Wallace As Sales Representative

George F. Wallace has been appointed sales representative in the northern Texas and Oklahoma area, according to C. T. Fuller, southwestern sales manager for Wolverine Tube, division of Calumet & Hecla, Inc.

Formerly with National Supply Co., Wallace will headquarter in Wolverine's Dallas office.

Harrisburg Sales Promotes Six, Expands Field Service

Harrisburg Sales & Service, Inc., has formed three new sales districts at Houston, Odessa, and Houma, La., according to A. B. Quinn, Harrisburg president. R. T. Stewart, former Houston district manager, was named to head the new Houston sales district. Jack Floyd was promoted from sales engineer to South Louisiana district manager, and T. E. Nesky was named to head the West Texas district. Nesky formerly was a sales representative in Odessa.

R. T. STEWART

JACK FLOYD

T. E. NESKY

Assuming duties as sales engineer at New Iberia, La., is E. O. Hudnell, who was promoted from field salesman at Houston. Also taking over new sales positions are W. E. Smith who was named salesman at Andrews, Tex., and J. A. Brookman, who was promoted to field salesman representing Harrisburg in North Texas, southern Oklahoma and the Panhandle, with headquarters in Oklahoma City.

Ampco to Build Southwest Plant, Sales Headquarters

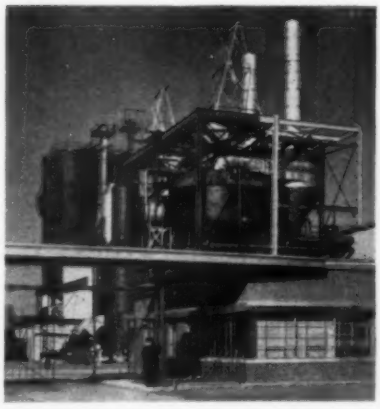
Ampco Metal, Inc., Milwaukee, will build a $200,000 branch foundry at Garland, Tex., near Dallas. The 15,000-sq.-ft. plant, expected to be in operation by March 1958, will include sand and centrifugal foundries, heat-treating facilities and some machining operations. It also will become the location of Ampco's principal sales and service offices in the Southwest.

J. D. Zaiser, company president, said manufacturing facilities will enable production of bronze castings weighing up to 1,000 lb. each and the supplying of aircraft-quality alloys to engineering specifications for a wide variety of services.

Ampco's Southwest plant is the company's second branch plant, the first having been established in Burbank, Calif., in 1943.

J. B. Beaird Holds Annual Sales Meeting

More than 40 members of The J. B. Beaird Co., Inc., sales organization returned to Shreveport recently from posts throughout the country for their annual sales meeting. Representing the five Beaird divisions, the men were brought abreast of sales techniques, new developments in Beaird's heavy steel products and company policies by the respective sales managers and other key home office personnel. M. A. Finuf, general manager of sales, declared that over 25 per cent of the sales representatives had passed their fifth service anniversaries with the company.



Davison Plant Supplies Catalyst for Canada

Now fully in operation, the $6,000,000 plant of Davison Chemical Co., Ltd., at Valleyfield, near Montreal, is producing synthetic fluid cracking catalyst for Canadian refineries. The company is affiliated with the Davison Chemical Co., division of W. R. Grace & Co. The Canadian plant is similar in design and identical in product to Davison plants at Baltimore, Cincinnati and Lake Charles, La.

William B. Davis is manager; Frederick C. Pott, plant superintendent; Pierre Moreau, assistant plant superintendent; Allan E. Irvine, office manager; W. G. Beer, plant engineer; and Camil Dumoulin, chief chemist. Marketing of the plant's product will be through a sales office maintained in Toronto under the supervision of Alan W. Bennett.

U. S. Steel Supply Names Swain as District Manager

Howard C. Swain has been named district manager of the United States Steel Supply Division at Houston, according to John H. Morava, president of this division of United States Steel Corp.

H. C. SWAIN

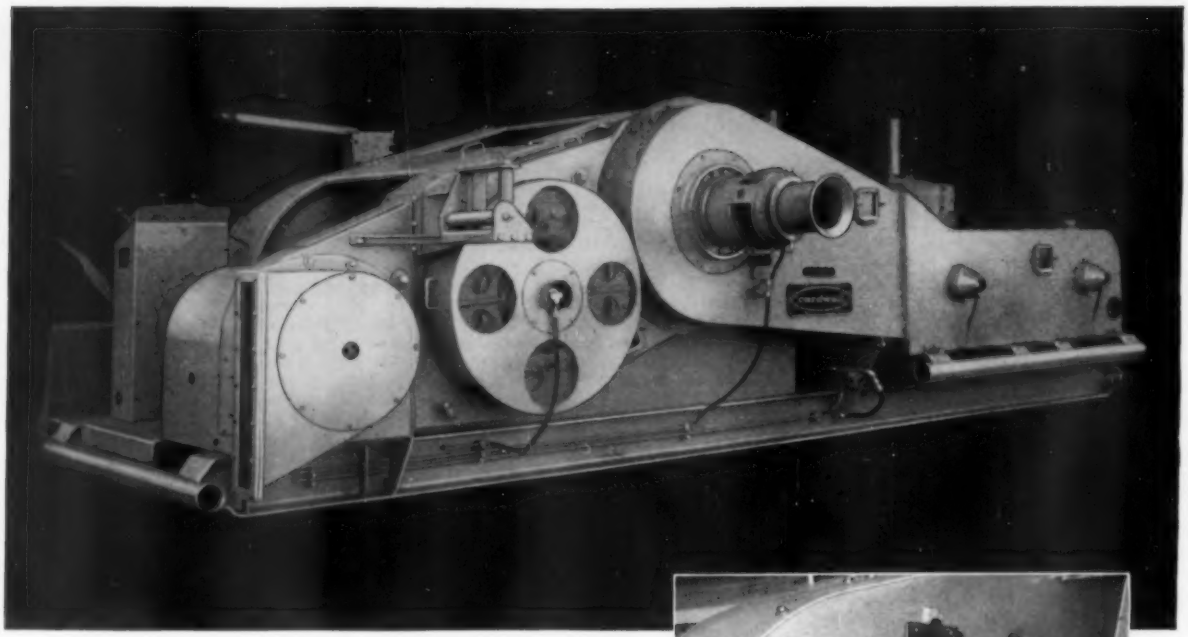
Swain, who joined U. S. Steel Supply in 1948, served as telephone salesman, office manager and assistant district manager at Pittsburgh. In 1956 he was made manager of sales. Earlier this year he was named assistant district manager and manager of sales, Pittsburgh, his most recent post.

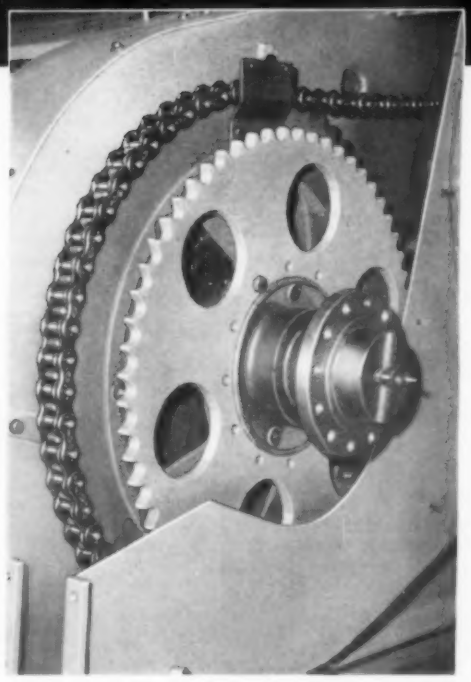
Sooner Pipe & Supply Opens Store at Cherokee, Okla.

Sooner Pipe & Supply Corp. has opened a new oil-field supply store at Cherokee to serve the oil industry in Northwest Oklahoma and South Central Kansas. Leo Mullins, previously assistant store manager at Pawhuska, Okla., will serve as store manager, with Gene Franklin, formerly with Jarecki Manufacturing Co., as field representative. The store will be under the direct supervision of Sidney Selinger, sales manager for the firm.

Sooner Pipe & Supply Corp. has a district office at Wichita, Kans., with other store locations at Hays, Kans., and Pawhuska, and with pipe storage yards at Sand Springs, Okla.; Great Bend, Galva, Russell, Plainville, and Medicine Lodge, Kans.

Officers of the firm headquartered in Tulsa are Sam Zarrow, president, and Henry Zarrow, vice president.





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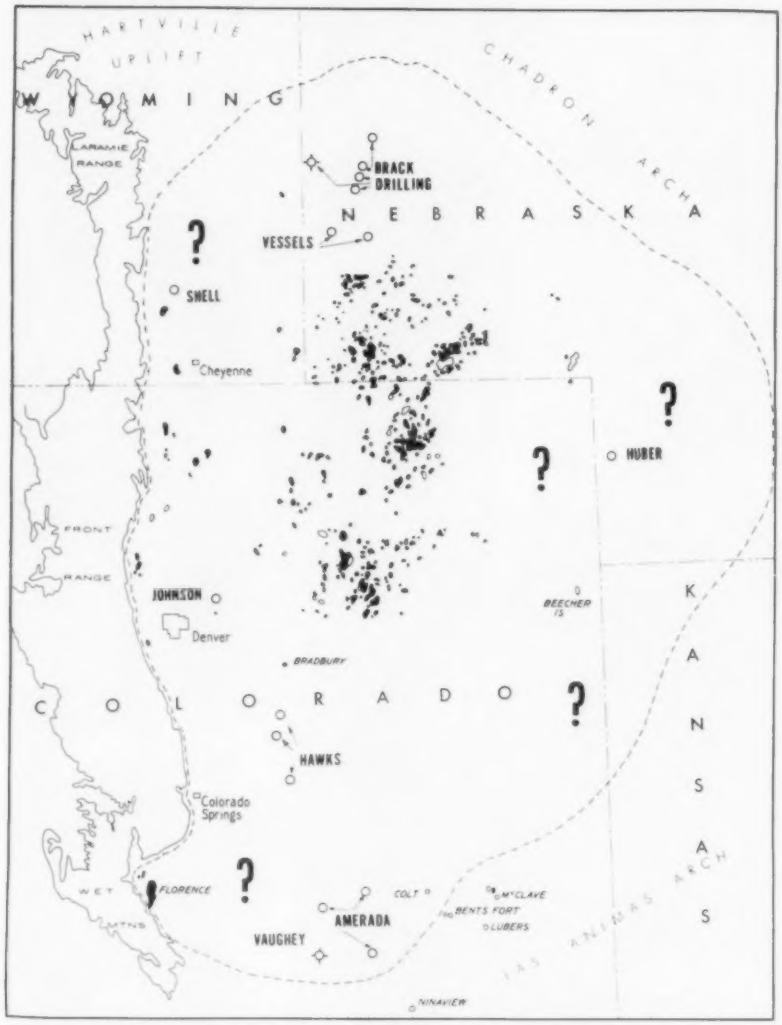


THIRTEEN RANK WILDCATS now probing the distant flanks of the Denver basin presage a new interest in this Colorado-Nebraska oil bowl.

"13 May Be Fateful"

By Frank J. Gardner
Exploration Editor

YOU SEE on this page a map of the most frustrating basin yet to confront Rocky Mountain geologists. It's full of oil. It's much more accessible and more pleasant to work than most oil basins. But it's awfully stingy with its subsurface secrets. If you want to find its oil, you've got to drill at random. It defies the seismograph, the surface geologist, and the subsurface man. Its sands come in and play out in the zaniest patterns; hence the spotty picture displayed by the producing fields. If you're good at playing the trends, you have a 50-50 chance of coming out ahead of the game, and most success to date has sprung from clever combinations of trend play and random drilling . . . a game of directional checkers, if you please. It's the Denver basin.

Only two targets . . . As one major-company man puts it, "We line up our blocks along the trends. Then we drill in the center of each section. If we hit, that's fine—we step out from there. If we miss, we're not interested in anything smaller than a section anyway, and we'll probably hit it in the next one." This is hardly what we'd call scientific exploration, but it works, and it's just about the only approach in this enigmatic basin. There are only two targets—the "D" and the "J"—both Dakota-Lower Cretaceous sands. In two or three fields, deeper production has been found in the Lyons-Permian section, but the vast majority of wildcats have stopped in the Cretaceous.

These observations apply to the broad sweep of the eastern and central parts of the basin. On its west flank and in its deepest part, fronting the Rocky Mountains, the situation is entirely different. Here structure becomes very important. But over most of the explored eastern and central parts, lithologic variation controls oil pooling, and even in those fields where structure plays a role, stratigraphy is the controlling factor.

In a flank attack . . . As a result of all this, the north-central part of the Denver basin is one of the most intensely drilled areas in the Rockies. The wildcat density is high. But out toward the flanks in all directions, operators have not ventured in such numbers.

Denver basin operators now are beginning such flank campaigns. On the north, Sioux County, Nebraska, a quartet of wildcats by Brack Drilling Co. fall in a straight line pointing to the Chadron arch. The first of Brack's wells, to the west of these four, was a 6,206-ft. failure. South of these, in Scotts Bluff County, Tom Vessels, Jr., has a pair of outposts busy; his first in this area also was dry at 6,295 ft.

Looking south, an even more interesting flank attack is under way. Amerada Petroleum Corp. has staked two wildcats in Crowley County, Colorado, and one in Otero County. In this vicinity, Vaughey & Vaughey have just finished a 6,213-ft. granite failure. Between Amerada's wildcat trio and the center-basin fields, Jeff Hawks has announced another three southern outposts in Elbert and El Paso counties. Far to the east, in Chase County, Nebraska, J. M. Huber Corp. is sinking its 1 Colson for a look-see at subsurface conditions there.

But 13 may be fateful . . . So at long last, perhaps we may see the Denver basin fairway leap away from dead center. Thirteen rank wildcats whirling on three far-flung flanks should produce a couple of strikes, if the ratio holds as in the past. If they do, you can look for a revival of activity in the basin—probably nothing to equal its 1954-1955 heyday, but at least a new lease on life.

Skelly Has Big Gasser at Its Mississippi Wildcat

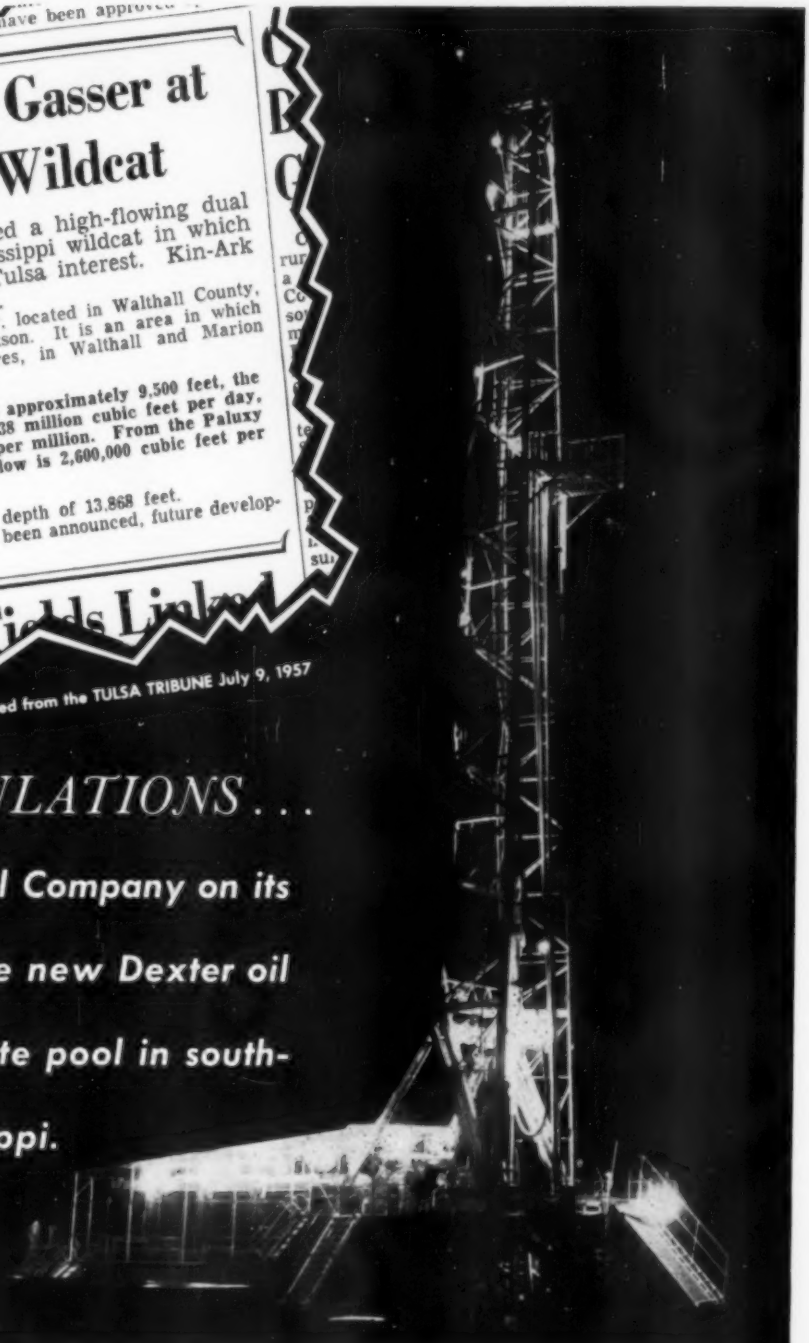
Skelly Oil Co. has completed a high-flowing dual zone gas discovery at a Mississippi wildcat in which there has been considerable Tulsa interest. Kin-Ark Oil Co. is a partner in the well.

The operation is the No. 1 Dexter, located in Walthall County, Miss., about 90 miles south of Jackson. It is an area in which Skelly owns a block of 6,200 acres, in Walthall and Marion Counties.

From Lower Tuscaloosa sand at approximately 9,500 feet, the well had a potential open flow of 38 million cubic feet per day, with about 20 barrels of distillate per million. From the Paluxy sand at 13,500 feet the potential flow is 2,600,000 cubic feet per day.

The well was drilled to a total depth of 13,868 feet. Although definite plans have not been announced, future development of the area is expected.

Reprinted from the TULSA TRIBUNE July 9, 1957



CONGRATULATIONS . . .

to the Skelly Oil Company on its discovery of the new Dexter oil and gas distillate pool in south-central Mississippi.

Skelly No. 1 Dexter
Walthall County, Miss.

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Fig. 1—This interesting old map of 1880 indicated the oil-producing areas of the time (black) and possible areas for the future (shaded). Little did the experts of the '80's dream that the list of eight producing states would ever grow to . . .

In 1880, Six States Were "Oilers" . . .

. . . the 32 productive oil and gas states of 1957 (shaded). And of our 16 nonproductive states, at least half a dozen may yet come in. Fig. 2.

. . . Today There Are 32

By Dorsey Hager
Consulting Geologist, Salt Lake City

TWO MAPS of the United States are shown here, one map made in 1880 taken from an old U. S. Census Report of 1882, the other is a modern map of 1957, 77 years apart.

On the 1880 map (Map 1) oil-producing areas are limited to only a few states—Pennsylvania, New York, West Virginia, Ohio, Kentucky, and Tennessee — with showings of bitumen listed in a few other places. The "possible" areas were marked in yellow (here shaded), and the producing areas in red (here black). At that time there was only small commercial oil production west of the Mississippi River. There was some at Florence, Colo., and about 10,000 bbl. annually in California, mainly from pits, mines, and a few shallow holes drilled 100 ft. in depth in Ventura and in Los Angeles counties.

Then . . . In 1880, oil had been produced in quantity in New York, Pennsylvania, and West Virginia. A small amount came from Kentucky, Tennessee, and Ontario, Canada. Small wells or good showings had been found in Michigan, Wisconsin, Kansas, Nebraska, Colorado and California. Bitumen

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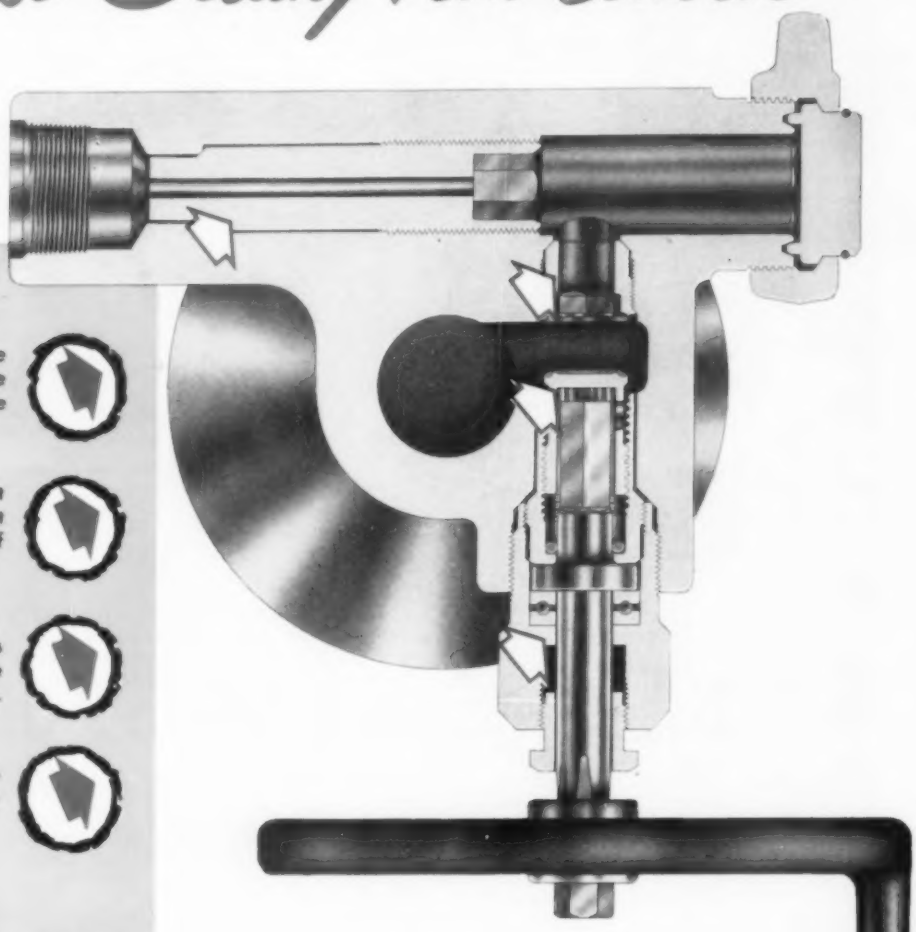

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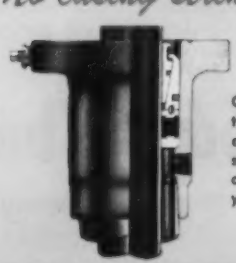


The O-C-T C-19 Casing head can support the longest strings with complete safety. It is the safest, most economical deep well casing head you can buy.

was reported in Louisiana, Texas, and Wyoming but nothing that was then considered important. Pennsylvania was the leading oil-producing state with an annual total of 26,000,000 bbl.

However, those "possible" areas on the old map were more or less prophetic. Every state in which bitumen was found with the exception of Wisconsin has since become a gas and oil-producing state, even if not important. Map indicates the new finds as well as the old ones over the United States.

Today, it is interesting to read the statement of S. F. Peckham, Special Agent, in his report to the Bureau of Census, October 1882. His observations given below were in answer to pessimistic producers in Pennsylvania who were bewailing the fact that no new oil was being found and the oil future looked dark. Also, as a conservationist, he bewailed the loss of forests and of oil due to wasteful procedure:

"While it is not probable that the deposits of petroleum within the earth's crust are being practically increased at the present time, there is reason to believe that the supply is ample for an indefinite period. When prophecy, indulged even by the most sagacious producers of longest experience, proves so futile, I think I am warranted in expressing an opinion that, as regards the future supply of petroleum, the drill alone gives valid testimony. Yet this fact is worthy of the most serious consideration.

"The production of petroleum as at present conducted is **wasteful in the extreme.** No thoughtful person can escape the conviction that future generations will want what this present generation is destroying to no purpose. 'After us the deluge' is written all over the oil region in the destruction of the forests and in the waste of oil itself."

However, a production of over 7,500,000 bbl. daily in 1957 could hardly have been credited in 1880 when the production was 80,000 bbl. daily. The volume has increased over 94 times.

And now . . . On the 1957 map, note the gas and oil fields that have been found in the United States. Now only 16 states are nonproductive. The New England and coastal states from New Jersey, excluding Florida, Virginia, and Maryland, as yet have no gas nor oil production. Wisconsin, Minnesota, and Iowa form another group, then westward to Idaho and Oregon. Washington now has its first commercial oil well on the Pacific Coast, and an abandoned gas field in Rattlesnake Hills in the south-central part of the state.

Further testing may yet bring Idaho and Oregon into the ranks of commercial production. We may also see commercial gas and oil in several other states. Southwest Georgia, southern Iowa, and eastern Wisconsin should have some small oil production. Parts of the New England states are not hopeless and may yet prove to have commercial production of gas or oil.

As an example of what drilling can accomplish, consider Utah. That state, before 1947, had a small abandoned gas field near Vernal, gas in Clay Basin gas field just south of the Wyoming line, a few small noncommercial oil wells at Mexican Hat, and a small noncommercial oil field at Virgin in Southwest Utah, plus some gas and oil at Boundary Butte.

Today, Utah has two major oil fields of large size, Red Wash in Uintah County and Aneth and related fields in the great Four Corners area. There are also several important natural-gas fields, especially Clear Creek in the central part of Utah and the gas fields in the east. There are possibilities of numerous other fields. All this has happened within the last 7 years.

Also, in the past 10 years, North Dakota and Nebraska have become important gas and oil areas, while Alabama, northeastern Arizona, eastern Nevada, western Washington, South Dakota, and southern Tennessee have developed either gas or oil production. The Denver-Julesburg basin of eastern Colorado and northwestern Nebraska is developing important new reserves. The Sierra Grande or Las Animas Arch of southeastern Colorado is now in the picture.

Well density important . . . We must not overlook the well-density factor. In 1935 the writer found that in some of the intensively drilled states such as Pennsylvania and West Virginia (excluding the metamorphosed areas), five wells per square mile of sediments for Pennsylvania, four wells per square mile for West Virginia, two wells per square mile for Oklahoma, and 0.4 well per square mile for Texas produced gas and oil up to that time. It is true of course that many of the wells were shallow but the relative-density principle must still be kept in mind.

This principle is working out well in Central and West Texas, in Oklahoma, in New Mexico and in Kansas and is particularly important as much of the production in Pennsylvania and West Virginia comes from stratigraphic traps. Many such accumulations, it is true, are influenced by structural features occurring far down the flanks of anticlinal features or on noses.

It is surprising over the years to see how well the density principle has worked. While necessarily there are numerous assumptions, the broad principle must be considered. Even in areas where the folds have high dips there may be numerous traps occurring nearer to the synclinal axes than to the crests of the anticlines.

Also, numerous fields occur on homoclines or regional monoclines totally lacking in folding which could form traps. Here the drill is the only tool to find new fields although seismic reflections may be of assistance. Where log data are available lithofacies changes may also be of assistance in outlining favorable areas for testing.

What of the Future?

There still remain large areas of possible gas and oil lands in North America that have been only slightly explored, and large areas in all the oil-producing states in which stratigraphic traps will be found and deeper pays will be uncovered. In many areas, shallow "pays" have been bypassed. Pulling back to them will add new oil.

Much new salt-dome production in Texas and in Louisiana has been found by offshore drilling; 100 fields now produce, with the possibilities of numerous known domes yet to be drilled. California is still finding new fields. Deeper drilling in Mississippi, Louisiana, and in West Texas, in eastern New Mexico, in the Anadarko basin of Oklahoma, and in Southwest Kansas has opened new fields. The new strike in Oldham County, Texas, will intensify drilling in the Palo Duro basin.

In the light of past procedures, with 13,500 or more petroleum geologists and geophysicists, and several thousand petroleum engineers, with the oil companies willing to spend money for exploration, with improved drilling techniques which will allow drilling to 30,000 ft. and more in depth, with improved completion techniques, it is indeed a rash man who can predict a foreseeable demise of the oil and gas business. Sometimes one marvels at how blind many of us have been in the past.

Many new fields to come . . . In conclusion, it is my considered judgment that further exploration will open many new fields and that our gas and oil supplies will be maintained, even increased, over the years for some time to come.

1. By the finding of numerous "strat" traps.
2. By the finding of folds not showing at the surface.
3. By opening deeper "pays."
4. By better completion techniques.

Geologists plan Mid-Continent regional meeting of the A.A.P.G., in Tulsa, Oct. 30-Nov. 1. Jerry Upp, Sinclair Oil & Gas Co., general chairman (left), discusses the stimulating program with E. Floyd Miller (center), consulting geologist and convention finance chairman, and Louis H. Lukert (right), division geologist, The Texas Co., and program chairman.

Geologists Will Ponder New Techniques, New Basins

NEW METHODS of exploration, the potential of new oil basins, and several new oil fields form the topics for the technical sessions of the Mid-Continent regional meeting of the American Association of Petroleum Geologists October 31-November 1. Preconvention registration indicates that 1,000-1,500 geologists will attend the 2-day meeting.

Papers will be of interest and informative to geologists who have charge of planning exploration programs, the intermediate group who assist in this planning and the large group of younger geologists engaged in exploration for oil.

The general theme centers around Paleozoic stratigraphy and sedimentation in the Mid-Continent. However, more stress has been placed on the rocks' reservoir characteristics, the formation and occurrence of oil traps, geological and geophysical tools which will enable geologists to improve geological interpretations and methods to better evaluate prospective horizons.

Opportunities unlimited . . . The Mid-Continent is called Land of Geological Opportunities. This region has a large number of diversified oil and gas fields. Vast quantity of well records, samples, surface and subsurface maps, and engineering and production data furnish the basis for the four-dimensional thinking—length, breadth, thickness, and time—necessary to reconstruct the geologic history and thereby better predict what is under the surface. Unsurpassed opportunities are, therefore, offered the young geologist to learn the geology of petroleum, the technology of exploration and production, and the business of oil and gas. A. I. Levorsen, Tulsa, will bring out clearly why this is true and how the geologists, once trained, can apply this knowledge anywhere in the world.

Convention attendants will hear N. Wood Bass, counsultant, Denver, explain how sand bars which have features and distribution similar to sand bars on modern coast lines are being recognized as oil reservoirs in many parts of the geologic column. They occur in many widely spaced areas. Systems of sand bars are common features on many coasts of the world and their composition, origin, and distribution will be discussed. Bass states that it is truly remarkable that similar sand bodies of the geologic past have been so perfectly preserved in geologic time. A few examples include the so-called shoestring oil sands in the Cherokee shale in Kansas and Oklahoma. Some of the sand bodies in the Cretaceous system in the Denver basin of Colorado and Nebraska, and in the Powder basin of Wyoming, and the somewhat younger Cretaceous sands in the San Juan basin in New Mexico appear to have had a similar origin.

As a sequal to this paper J. Durwood Pate, independent geologist, Tulsa, will show that most stratigraphic traps along the northern shelf of the Anadarko basin are either due to convergence caused by truncation or onlap or interruption in deposition of sands and "reef" type limestones. Consequently modern drilling and completion methods are opening up extensive stratigraphic accumulations of oil and gas. The future looks bright for finding more strat traps in the Anadarko basin.

Morrow rocks . . . A symposium on the Morrow rocks of the Anadarko basin will be presented by representatives of the Tulsa, Panhandle, and Liberal geological societies. What's the extent of the Morrow? Is it worth looking for? Where is it producing? And why? How can it be predicted? This large area of Oklahoma, Kansas, and Texas is in the early stages of development and many reserves remain yet to be found.

What are the prospects in the Wichita Mountain Front Province of the Anadarko Basin? . . . A. R. Edwards, a geologist for Shell Oil Co. and whose company discovered and developed the important oil reserve in Elk City field, will discuss the types of Pennsylvanian reservoir rocks and the various facies changes both laterally and normal to the mountain flank. The area discussed extends from Cement field to the Oklahoma boundary.

Interesting structural aspects of this region and their effect on oil accumulation will be reviewed by Richard M. Riggs, consulting geologist, Oklahoma City. Representative cross-sections from the mountains into the basin through wells which encountered thrust faulting will help explain the orogenic movements. These movements produced a multiple overthrust complex along the mobile southern rim of the Anadarko basin.

The McAlester-Arkansas coal basin, an elongate arcuate basin lying in Southeast Oklahoma and Northwest Arkansas, has been the scene of exploration for many years but the best organized effort is now under way. Surface, subsurface, areal-photo interpretation and geophysical mapping methods are in use or have been attempted. The relative merits of these methods, the degree to which this area has been evaluated, and the areas being most

intensely explored will be reviewed by B. W. Miller, Gulf Oil Corp. geologist.

Ouachita Mountains . . . As the result of 2½ years of extensive field work in the Ouachita Mountains, Authors Peter Misch, of the University of Washington, and Keith Oles, member of Union Oil Co.'s speal exploration group, will present their views relative to the origin of the mountains. They have concluded that the stratigraphic and structural evidence indicates that the mountains are an autochthonous folded system. Such features as the Potato Hills anticlinorium, Round Prairie synclinorium, and Choctaw anticlinorium will be discussed. These authors believe that the contrast between the rocks of the Ouachita Mountains and those of the Arbuckle region, though real, is not abrupt. Most of the contrasted facies have transitional relationships. None exceeds those often encountered in adjacent, connected basins or different parts of the same basin.

Oklahoma's Six Provinces

Can more oil fields be expected from the Hunton in southern Oklahoma? . . . The post-Hunton unconformity and its effect on pre-Mississippian distribution in southern Oklahoma will be reviewed by Robert W. Maxwell, Gulf district geologist at Oklahoma City. A pre-Pennsylvanian paleogeologic map accompanied by a pre-Woodford distribution map will illustrates the extent of post-Hunton folding. This map suggests a framework for dividing southern Oklahoma into six geological provinces. The Hunton carbonate is an oil reservoir on the north flank of the Aylesworth anticline and has been informally called "Misener" and "Hunton detritum" in the Ardmore area.

North Madill field . . . North Madill field in Marshall County, Oklahoma, is one of the better Simpson fields discovered in Oklahoma within the last 3 years. The structure, according to Author Ross R. Gahring, Sinclair Oil & Gas Co., Ardmore, is a thrust-faulted anticline with the production on the northeast or upthrown side. Since the discovery in December 1954, 62 wells on 20-acre spacing have been drilled. Development is still continuing to the northwest, northeast, and southeast.

Are oil fields likely to be found in the Central Nebraska basin? . . . This basin, where the basement rocks can be reached by drilling to depths of 4,500 ft., or less, and the small number of significant tests has not been adequately explored to date. Rock characters, reservoir conditions, and ground-water mineralization will be reviewed by E. C. Reed, director, Nebraska Geological Survey. The complex geologic history of the region presents some interesting possibilities for commercial accumulations of oil. One question remains unanswered. Could this be an area where we should be more actively exploring for oil? **End.**

A Rare Bird . . .

By Donald M. Woodward

THE LANDMAN is a rare bird. Estimates place its total world population at from 5,000 to 10,000. While it ranges over the entire United States its principal habitat is in the South, Southwest and Mid-Continent areas. It is practically unknown in Mexico, England, Russia, or any other country where mineral rights are vested in the government, thereby eliminating trading in leases which is its chief food supply. Only in the United States where minerals are held by private citizens does an economic climate exist favorable to its propagation.

Its chief commercial importance is to the oil and gas industry where it is highly prized for its horse sense. Some of them are ostensibly able to divine the presence of oil several thousands of feet below the surface of the earth, but authorities are not agreed as to whether this uncanny ability stems from a highly developed olfactory system or whether it is in fact due to some mysterious sixth sense. While many are wild and love to fly in solitude and independence, hundreds have been tagged by various organizations engaged in the search for oil. Whether free or tagged, however, they always roost in high branches.

It is characterized by its chameleonic ability to adapt its coloration to surrounding foliage and, mockingbirdlike, it possesses an amazing dexterity to attune its song to harmonize with that of whatever covey in which it finds itself. It is especially known for its swarming habits and hundreds of them have been known to descend upon what is called a "hot play." At these times the parrotlike garrulity and gregariousness of this bird are especially evident.

The landman is as symbolic of the oil industry as the American eagle is of the United States. And like the American eagle, one thing is sure: Wherever it is found, it is the living symbol of free enterprise and private ownership.

(Reprinted from the American Landman, August 1957.)

EXPLORATION HIGHLIGHTS

APPALACHIAN

OHIO

Small Reese Pool Extended South

The small Reese pool in Tiverton Township, Coshocton County, was extended south into New Castle Township by Preston Oil Co. 5 M. W. C. District, Lot 29-1st. Qr. A 10-bbl. showing in Clinton sand at 3,246-3,306 ft. increased to 234 bbl. in 24 hours after fracture.

Danville Area Pool May Be Fair Sized

Development of the oil sand west of Danville now looks like there will be a fair-sized pool. The Casto et al 1 (3) J. A. Greer, Lot 9, Howard Township, Knox County, gaged 100 bbl. in 24 hours after fracturing Clinton sand at 2,659-2,708 ft.

Stark County Well Is Gas Discovery

Belden & Blake moved ½ mile west of gas production south of Massillon and brought in their 1 L. Hornberger, Section 24, Tuscarawas Township, Stark County, good for 2,500,000 cu. ft after fracture. Clinton sand was logged at 4,205-24 ft. with a fair showing natural.

PENNSYLVANIA

Cable Tools Move In To Complete Indiana Wildcat

In Buffington Township, Indiana County, Southwest Pennsylvania, Columbian Carbon Co. 1845 Bethlehem-Cuba Iron Mines Co., is shut down at 8,130 ft., to move in cable tools

EXPLORATION THIS WEEK

Appalachian	165
California	166
Canada	166
Illinois Basin	169
Kansas	169
Louisiana	170
Michigan	173
Nevada	173
New Mexico	175
Oklahoma	175
Rocky Mountains	176
North Dakota	179
Texas	179
Successful Wildcats	185

for completion in the Oriskany sand.

The Onondaga was found at 8,114 ft., the chert at 8,124 ft., where 7-in. casing was set.

WEST VIRGINIA

Deep Cabin Creek Wildcat Reaches Corniferous Lime

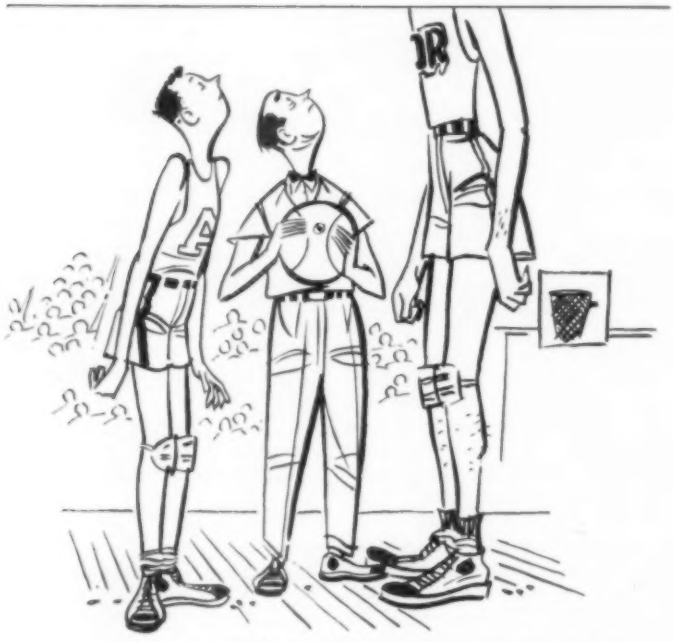
In Cabin Creek district, Kanawha County, Pure Oil Co. reached the Corniferous lime at 6,137 ft. at the 372 Williams Coal Co. The operator ran 5½-in. casing at this point. Drilling is at 6,140 ft.

EASTERN KENTUCKY

Good Shallow Gas Well Completed on Trace Fork

In Magoffin County and located on Trace Fork of Licking River, Kentucky West Virginia Gas Co. have completed a good shallow gas well. With a total depth of 1,063 ft. in Salt Sand (Pennsylvanian) topped at 955 ft., well gauged initially at the rate of 358,000 cu. ft. of gas daily. Well was not shot. Rock pressure in a 24-hour period registered 210 lb.

competition *makes it better!*



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Engineered answers to oil well cementing

BJ SERVICE, INC.

For details, see page 16

CALIFORNIA

Occidental Gets Good Well at Riverdale

Occidental Petroleum Corp. completed another good well in its play midway between Burrel and Riverdale fields in Fresno County. Occidental's newest well, 31A-7 Burrel, is located in NE NW 7-17s-19e, about ½-mile west of the nearest other producer in the small area. This extension test was brought in flowing 144 bbl. daily of clean unspecified gravity crude through an 8/64-in. choke, the zone perforated is between 6,241-6,245 ft., the top 4 ft. of a 20-ft. zone.

Less than ¼ mile northeast of Occidental's successful well, Carr, Wrath & Payne abandoned the 7,540 ft. 58-6 Ipsen after running a Schlumberger.

Gas Well at Wheeler Ridge

Richfield Oil Corp. plugged back its deep test mid-way between the Telegraph Hill area and regular Wheeler Ridge field production and completed it as a shallow gas field discovery. Richfield took the test to 10,536 ft., running a number of logs at intermediate intervals. After testing a zone at 10,381-10,536 ft., the operator plugged it back to above 2,340 ft. It was then redrilled to 2,580 ft. and completed as the gas discovery in an interval at 2,538-78 ft. Initial production was 540 M.c.f. daily through a 11/64-in. choke. The well, 26-29 KCL D, is located in NW SW 29-11n-20w, about 2,000 ft. from the nearest producer.

CANADA

Oil Reported at Crossfield Gas Strike

Tennessee Gas Transmission's well in the Crossfield area of southern Alberta, reported last week as a gas discovery in the Mississippian-Elkton horizon this week indicated an oil column lower in that formation. The commercial aspects of the find, however, are not as yet known as salt water was recovered upon completion of the lowest test in the structure. A total of 57 ft. of zone has been tested and it is known that at least the top 20 ft. contains wet-gas only. The water line contact point has not been released and further tests will have to be carried out before the value of the strike is known.

This well, T.G.T. 1-20-28-2 West Crossfield, is being drilled on LSD 1, 20-28-2w5. It lies 1¼ miles northeast of the Shell C10-18 Crossfield abandoned wildcat and is 3½ miles north-

Injection Well for Water Flooding Project, Caddo Parish, Louisiana

Injection Distribution Manifold for Water Flooding Project, Caddo Parish, Louisiana

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WEST COAST REPRESENTATIVE: Fred P. Koenig Company, Long Beach, Calif., 3815 Atlantic Avenue, GArfield 4-3834

CANADIAN REPRESENTATIVE: T. R. Pickford & Company, Ltd., Calgary, Alberta, 536 8th Avenue West, Phone 2-7371

EXPORT REPRESENTATIVE: New York 36, N. Y., 500 Fifth Ave., BRyant 9-2236

west of the Shell A13-2 Crossfield Cardium zone oil discovery well.

Discovery drill-stem test, reported last week, flowed gas at rate 8,000,000 cu. ft. and was accompanied by a heavy spray of condensate. Next test indicated an oil strike when 3,700 ft. of clean oil was recovered from the drill-stem. However, there was also 2,500 ft. of salt water with the oil recovery. Tennessee then went up-hole for its next test, a straddle-packer attempt and 4,670 ft. of clean oil and 330 ft. of oil-cut muddy fresh water (which was thought to be out of water cushion used as precautionary measure) was recovered.

Drilling operations have since resumed on the hole after which completion operations will be carried out on the hole.

ALBERTA

Home Hits Third Oil Discovery in Devonian

The Slave Point-Devonian, new pay horizon in western Canada, now produces at its third discovery area in the Virginia Hills-Swan Hills region of northwestern Alberta. The newest addition is Home Oil Co., Ltd., et al 11-19 Edith Lake, 6 miles southwest of Swan Hills field.

Edith Lake is the third Slave Point-Devonian discovery in the Virginia Hills-Swan Hills region of northwest Alberta.

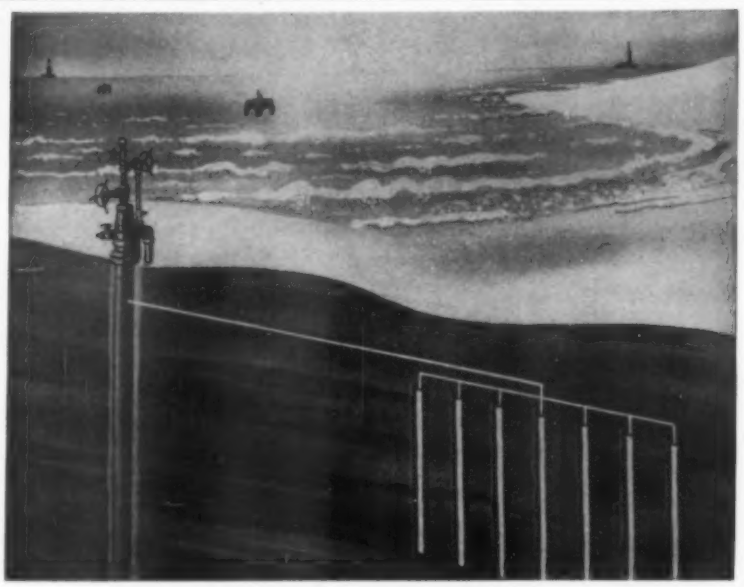
On first drill-stem test in the Slave Point at 8,180-8,208 ft. the well flowed light gravity oil to the surface and gave a full pipe recovery of oil. The test was run about 300 ft. above the base of the Slave Point.

Location of the well is on LSD 11, 19-67-10w5, in an area of almost inaccessability except during the winter. Dvelopment of the Virginia Hills-Swan Hills region has been difficult this summer. The Swan Hills discovery hasn't yet had production tests, but the Virginia Hills discovery, which set off a wildcat excitement in Canada not seen since Red Earth, netted 1,200 bbl. per day from the Slave Point.

Success Apparent at Innisfail Stepout

Another well in the Innisfail area of southern Alberta, operated by Canadian Oil Companies, Ltd., and drilled as a step-out test to its initial D3 strike has reached that oil-bearing structure in the area and indications are, although only one drill-stem test has been run, that it will prove productive at this test as well. Interest in the area is increasing steadily and at the present time, seven drilling rigs are probing the subsurface with the Devonian horizon as their objectives. This total will likely be increased to nine by the middle of next month.

The significant south step-out well brought in by Canadian Oil and its partners, the Calgary & Edmonton Corp. and Security Freehold Petroleums, is presently bottomed 10 ft. below the reef contact point, which incidentally is 10 ft. higher than at the discovery, and production casing is being set. After that string of pipe is set, coring and testing operations will



CASING IN 62 OIL WELLS PROTECTED FROM CORROSION

Here's how an oil producing company on the Gulf Coast stopped external casing corrosion on 62 of its wells. Five of the wells were in a salt water bay.

Potential-drop profiles indicated that cathodic protection could be applied to the total depth of 5,500 feet. CSI determined the current requirements, using the log current-potential method.

Then CSI engineers designed and installed a protective system for each well based on a guaranteed current output. The range of current requirements was from 0.5 to 6.2 amperes. The necessary current was delivered from ground beds each containing from two to 16 magnesium anodes. Galvomags, Dow's new high potential anodes, were used in special lengths to provide 10-year installation life at the lowest possible cost. This cost ranged from $215 to $510 per well.

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be resumed and the company is looking for a thicker than 150 ft. pay sector. There was 148 ft. of pay zone present in the discovery hole.

Test at the well, White Rose-C. & E 11-3 Innisfail, on LSD 11, 3-35-1w5, was bottomed at 8,529 ft. and a gas flow rate of 2,400,000 cu. ft. daily was measured. Pipe recovery consisted of 90 ft. of clean oil and 960 ft. of very gassy oil-cut mud. The venture lies 1½ miles south-southeast of the discovery test and 60 miles due north of Calgary.

ILLINOIS BASIN

ILLINOIS

Hardin Sand Discovery Seen in Sangamon County

A wildcat in Sangamon, 8 miles east of the state capital city of Springfield, recovered 1,285 ft. of gas, 127 ft. of oil and 25 ft. of heavily oil-mixed mud on a drill-stem test of the Hardin sand at 1,654-75 ft. The indicated discovery for Sangamon County is V. S. & S. Drilling Co.'s 1 Jane Spicer in SE SE SE 6-15n-3w.

O'Hara Discovery Indicated East of West Salem

Bell Bros. have an indicated discovery at their 1 Daisy Feldman wildcat in Edwards County, 2 miles east of West Salem in NW SE NW 10-1n-14w.

The O'Hara test recovered 480 ft. of oil and 180 ft. of mud-mixed oil on drill-stem test at 2,945-42 ft. Location is 1 mile from production.

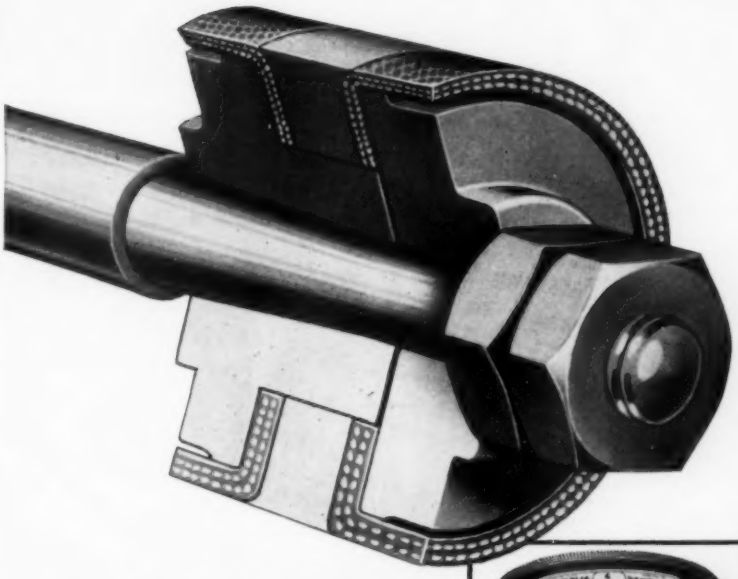
KANSAS

Remote Western Tests Hint Possible Production

Two rank wildcats located 5 miles apart in Greeley County, 5 and 9 miles south and southwest of Tribune, respectively, could open first production for this western Kansas County.

General Crude and Van Grisso Oil Co. have set production string and are testing at the 1 Edman in C SW SW 18-19s-40w, 5 miles southwest of Tribune. A swab test of 5 hours duration got 4½ bbl. of oil per hour, natural from Hugoton-Permian perforations at 3,939-45 ft.; acid treatment and another swab test got 28 bbl. of new oil per hour in 4 hours. Operators are still testing.

Drill-stem tests at 2,872-2,931 ft. got 90 ft. of gas-cut mud. 210 ft. of



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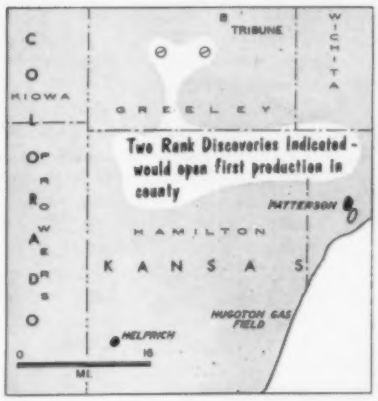

Two rank wildcats in Greeley County, extreme western Kansas, could open first production in this county.

very heavily gas-cut mud, and 90 ft. of mud and water. Another test at 2,930-79 ft. recovered 165 ft. of slightly gas-cut mud.

. . . **Second prospect.** Another wildcat in this area, the Honaker-Davis 1 Pearson in C NE SW 17-19s-41w, 9 miles southwest of Tribune and 5 miles west of the 1 Edman, tested gas in the Fort Riley-Permian formation at 2,854-85 ft. and 2,876-2,916 ft. Drilling continues below 5,400 ft. Tops here are: Winfield 2,824 ft., upper Fort Riley 2,854 ft., lower Fort Riley 2,926 ft., Council Grove 3,026 ft., Wabaunsee-Penn 3,464 ft., Shawnee 3,666 ft., Heebner 4,004 ft., Toronto 4,018 ft., and Lansing 4,121 ft.

LOUISIANA

OFFSHORE

Deeper Pay Tapped in Block 86, South Timbalier

Sinclair Oil & Gas Co. and others have opened a deeper oil zone and extended production in Block 86, South Timbalier area, off the Louisiana coast in the Gulf of Mexico. The block is located 23 miles from the coast.

The federal lease block is owned one-fourth each by Sinclair, the operator, El Paso Natural Gas Co., Sohio Petroleum Co., and Peoples Production Co.

On a 6-hour test of perforations opposite a Miocene sand at 13,184 to 13,194 ft., the A-3 well flowed at the rate of 481 bbl. of 34°-gravity oil per day through a 10/64-in. choke. Gas-oil ratio was 604:1.

Sinclair continued to test the well, located on a 5,000-acre federal lease concentration in Blocks 85 and 86.

The first two wells drilled in the

The "Cone Nebula" in the constellation of Monocerus photographed through the 200-inch Hale telescope of the Palomar Observatory. This mass of stars is about 1,000 light-years, or roughly six million billion miles from the earth.

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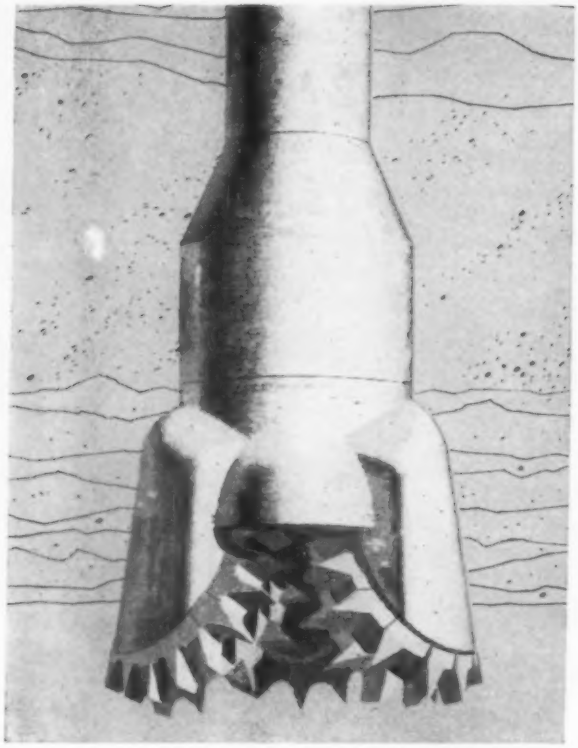

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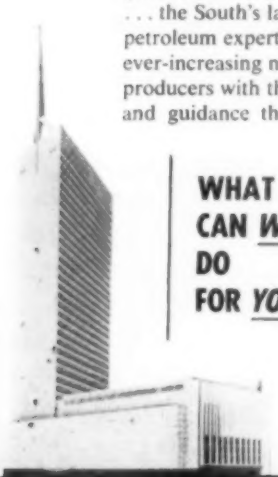

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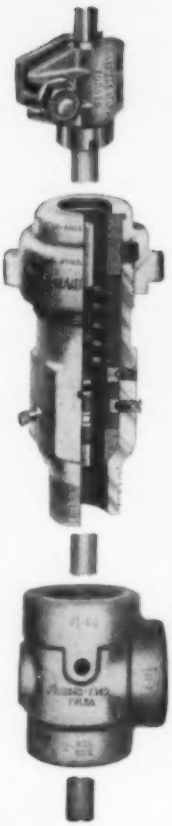

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block were completed in separate, shallower zones of the Miocene.

The field, located some 85 miles south of New Orleans, is being developed from a self-contained platform in 92 ft. of water.

SOUTH LOUISIANA

Vermilion Parish Has New Oil Discovery

Trice Petroleum Co. et al have a new oil discovery in Vermilion Parish at the 1 Wise, 62-13s-3e, 3 miles southwest of Erath field production.

The flow at the well was at the daily rate of 175 bbl. from perforations at 10,617-23 ft. Gravity is 48°.

Gas Pool Opened at Terrebonne Wildcat

A new gas discovery was reported in Terrebonne Parish at Austral Oil Exploration Co., Inc., 1 E. J. DuPlantis, 2½ miles south of Bourg field in 49-18s-18e.

The well flowed 4,020 M.c.f. of gas per day plus 95 bbl. of distillate per day on 10/64-in. choke from deep perforations at 12,545-56 ft.

MICHIGAN

Southwest Limit Appears Found at Reynolds

Reynolds oil field, Montcalm County, may have been limited to further expansion on the southwest with Russell D. Otterbine's A-2 Halladay, SE NW SW 18-12n-9w, drilling objective Dundee Reed City zone dry at 3,357 ft. Top of Dundee was logged at 3,227 ft. Test is located on the southwest flank of the pool as now defined.

- Meanwhile, McClure Oil Co. and T. W. Hartman's 1 Austin, SW SE SE 18-11n-9w, Maple Valley Township wildcat, 6 miles south of Reynolds field, logged Dundee lime at 3,182 ft. and was drilling ahead at 3,202 ft., apparently missing a pay section.
- W. L. Harvey's 1 Kirkpatrick SE SE NE 1-18n-5w, Clare County, wildcat, logged Dundee objective at 4,148 ft. and carried hole full of water at 4,260 ft. Operator announced intention to deepen to 5,200 ft. to test Richfield for oil.

NEVADA

Standard Quits Nevada Test

Drilling activity took a nose-dive in Nevada when one wildcat was abandoned and another suspended.

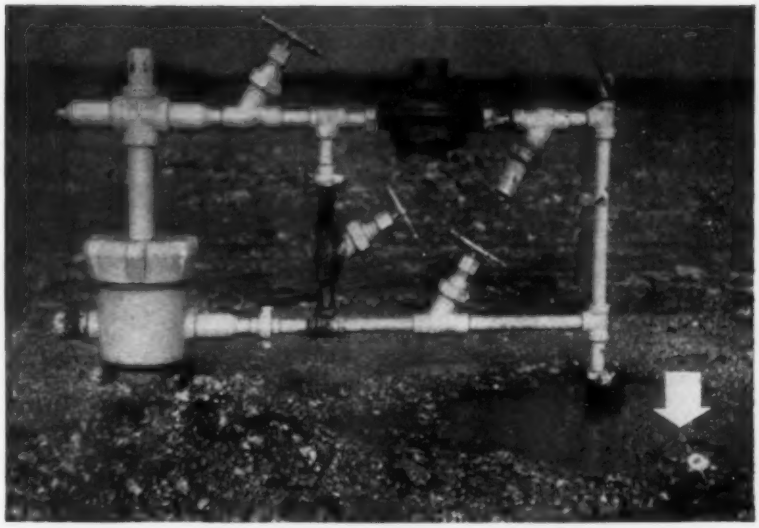

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Fig. 2698—2000 lb WOG Globe Stop Valve

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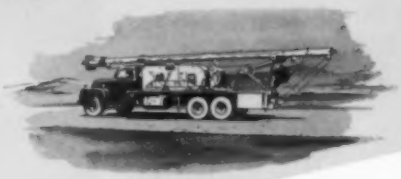

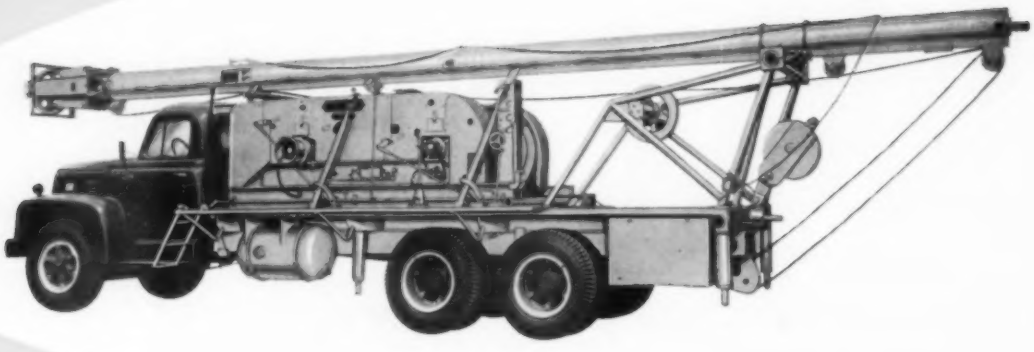

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A-1-57

Standard Oil Co. of California plugged and abandoned its White River Valley wildcat after running logs in the 4,850 ft. hole. This was a joint venture with Shell Oil Co. with Standard as operator. The well was located in NW NW 19-10n-62s in White Pine County, approximately 27 miles northeast of Shell's Railroad Valley production and 38 miles southwest of the town of Ely.

- Meanwhile, in northern Nevada, J. O. Blalock suspended operations at 3,400 ft. on his wildcat, 1 Orewitz, in the Battle Mountain region of Lander County.
- This left West End Opoteca Mines Co. and Janoil Corp. with the state's only active drilling project. It is 28-1 USL, located in Nye County about 12 miles northwest of the Standard abandonment. This well was drilling below 602 ft. in grey lime.

NEW MEXICO

SAN JUAN BASIN

Gallup Well No. 2 Finaled In Southeast Blanco Area

The second Gallup producer in Southeast Blanco area, Rio Arriba County, was completed by Skelly Oil Co.

The 16 Jicarilla-C, SE NW NW 34-25n-5w, 3 miles west of Amerada Petroleum Corp. 5 Jicarilla-Apache-"A," flowed 192 bbl. of oil daily from perforations in the Gallup sand at 6,096-6,176 ft. The Amerada well was completed in 1956 for 13 bbl. per day. Nearest production (Gallup) to this Amerada well last year was at Tocito pool 12 miles northwest.

OKLAHOMA

NORTHWEST

Two Wells in Woodward Trend Find Gas and Oil

Cities Service Oil Co. and Pan American Petroleum Co. reported indicated discoveries at two northwestern Oklahoma wildcats, one in Woodward County, the other in Ellis—both in the growing Woodward trend area.

Cities Service 1 Roberts-C, C NE SW 31-23n-18w, northeast of the city of Woodward, flowed 38.61 bbl. of 34°-gravity oil in 24 hours from Chester-Mississippian at 7,328-34 ft. The operator will fracture before further tests.

In Ellis County, Pan American's 1 Tune, C NW SE 35-24n-23w, in the northeastern part of the county, flowed 4,100 M.c.f. of gas per day with recovery of 30 ft. distillate, 60 ft. of very heavily distillate-cut mud and 270 ft. of gas and distillate-cut mud on test of the Morrow sand at 7,852-7,922 ft. The operator is coring ahead at this indicated new pool for Ellis County.

OKLAHOMA PANHANDLE

Keyes Gas Field Extended With Good Producer

Colorado Interstate Gas Co. extended Keyes gas field at 1 Francis in C NE 6-4n-8eCM, Cimarron County. The well flowed 15,500 M.c.f. of gas per day on tests of the Keyes-basal Pennsylvanian sand at 4,790-4,808 ft. The operator will fracture before further tests are made.

SOUTHWEST

Change in Contract Will Put Kreiger Well Deeper

Contract was extended at British-American Oil Producing Co.'s famous 1 Kreiger deep wildcat in Carter-Knox field, Stephens County side, to 17,500 ft. for more Arbuckle drilling.

The well, one of nine ultra-deep

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wildcats in this Grady-Stephens county field, is below 17,106 ft. Commercial production has been found in the Viola, second and third Bromide sands, and shows are reported in the McIntosh and Oil Creek sands. Commercial production in the Oil Creek would make it the state's deepest producer.

Census Reveals Tulsa Leads in Geologists

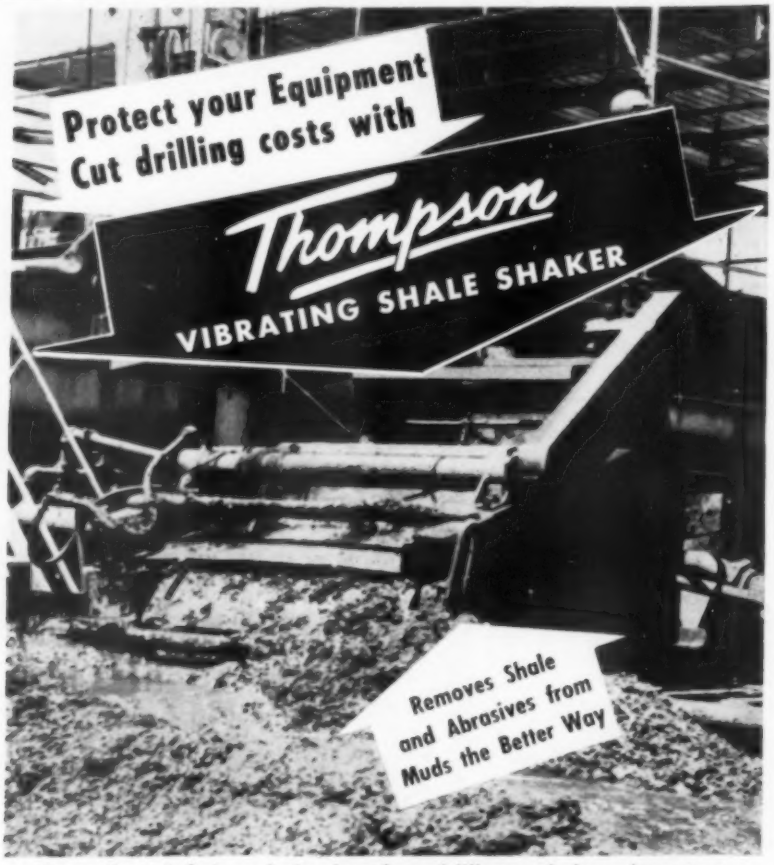
Oklahoma geologists are a joining bunch, according to an informal census taken by Dr. Carl C. Branson, director of the school of geology at the University of Oklahoma.

Dr. Branson's census, published in the September issue of Oklahoma Geology Notes, shows a total of 3,941 known geological and geophysical society memberships of state residents. There are about 1,970 resident Oklahoma geologists, Dr. Branson points out, so on an average each belongs to two societies.

The census was taken after recent proposals to set up regional sections of the Geological Society of America. It has been proposed that Oklahoma be part of a region consisting also of Texas and old Mexico. This line-up was based upon figures counting fellows and members in the region.

As Oklahoma is conspicuously low in number of G.S.A. fellows, and only fellows vote, Dr. Branson suggests that it would seem much better to group Oklahoma with Kansas, Texas, Arkansas, Missouri, and possibly Nebraska.

Distribution of geological society memberships among the cities of Oklahoma is: Tulsa, 1,726; Oklahoma City, 1,207; Ardmore, 246; Bartlesville, 173; Norman, 89; Shawnee, 84; Ponca City, 79; Okmulgee, 45; Duncan, 37; Enid, 21; others, 134.



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ROCKY MOUNTAINS

COLORADO

Garfield County Wildcat Flows Gas From Buckhorn

National Associated Petroleum Co. 1-A Federal, SE SE SW 22-7s-104w, Garfield County, western Colorado, flowed gas at the estimated rate of 5,000 M.c.f. per day from the Lower Cretaceous-Buckhorn at 4,078-4,108 ft.

This rank discovery is 7 miles northwest of Garmesa field and 6 miles northeast of Bar-X field. The closest previous drilling is 3 miles away.

WYOMING

Denver Basin "J" Sand Discovery Completed

The Wyoming portion of the Denver basin picked up a new "J" sand Cretaceous oil discovery. The Laramie County wildcat is Wyoming Western Oil Co.'s 1 Floy in C SW SW 4-15n-61w, 10 miles northwest of Pine Bluffs field. Pump gage was 170 bbl. per day from perforations at 7,625-37 ft.

An offset to the north has been staked at 2 Floy in C NW SW 4-15n-61w, and drilling is below 3,700 ft. The same firm has staked a wildcat 1½ miles southwest at 1 Pence in C NE NE 17-15n-61w. This is the first Wyoming Denver basin discovery of importance since Torrington field was opened about 2 years ago.

Oil Flow Gaged at Elk Mountain Discovery

Pan American Petroleum Corp.'s Hanna basin Sundance-Jurassic discovery at East Elk Mountain in Carbon County flowed 501 bbl. of oil in 22½ hours on a test at 6,475-6,510 ft. The wildcat is the 1 UPRR-Anschutz Ranch, 6 miles southwest of South Big Medi-

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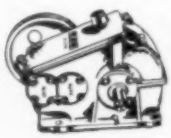

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cine Bow field in an area of no previous drilling. Closest Sundance oil is at the above mentioned field.

NORTH DAKOTA

Lignite Area Is State's Most Active Drilling Spot

New Ligmite field in Burke County has six wells drilling in and around the Midale reservoir. Phillips Petroleum Co. 1 Blom, C NW NW 19-162n-91w, 1½ miles southwest of the discovery well of the field, is acidizing perforations; Northern Natural Gas Co., Pan American Petroleum Corp. and Mobil Producing Co. have offset wells busy to the northwest, northeast, and southeast, respectively.

The pay zone in the new field, opened at Northeast Oil Drilling Co. 1 Bunting, is the Midale-Mississippian.

- Another wildcat is under way 3½ miles north of the field at Northwest-Central LeDuc 1 Klitzke in C SW SW 17-163n-31w. Unofficial reports credit the operators with finding some oil in the Midale on drill-stem test.
- Atlantic Refining Co. is also in the play at 1 Falck in C SE NW 24-163n-92w, 3½ miles northeast of the field.

Lignite is the first field in the off-Nesson anticline country in some time. Its apparent success should set off a new round of wildcatting in this vast area of North Dakota where such fields as Coteau and Bluell, Columbus, and Noonan have been tapped.

TEXAS

NORTH TEXAS

Nolan County Well Ellenburger Prospect

Champlin Oil & Refining Co. and R. J. Caraway 1 L. H. Beckham, 6 miles southwest of Trent in northwestern Nolan County, unloaded oil while pulling tubing following a drill-stem test in the Ellenburger at 6,285-6,335 ft. Oil had reached the surface in 70 minutes, but rate of flow was not reported.

A previous test of the Ellenburger at 6,191-6,208 ft., open 3 hours, recovered 135 ft. of clean oil, and 160 ft. of heavily oil and gas-cut mud.

The prospect has also indicated production from the Tannehill sand at 3,613-32 ft. and the Palo Pinto at 5,441-71 ft.

Location is in Section 2, Block X, T&P Survey, 2½ miles south of nearest production in Northwest Dora field. The same operators have made location

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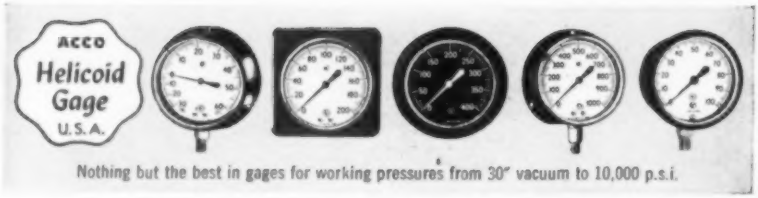

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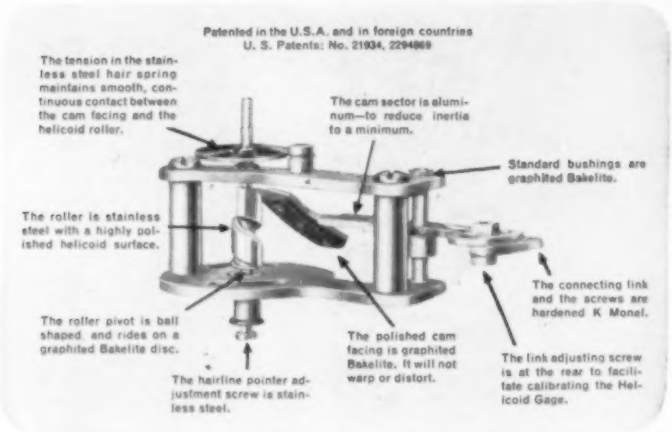
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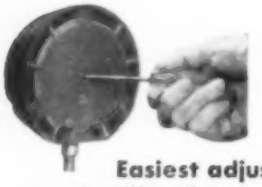

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ACCO TRADE MARK

for a northeast offset to the discovery, as the 1 TXL "B." Location is in Section 89, Block 20, T&P Survey. Projected depth of 6,700 ft. is expected to carry it into the Cambrian sands.

Conglomerate Discovery In Shackelford County

Wilson Exploration Co., Fort Worth, has filed for discovery application at its 1 Riney Simpson, located 2½ miles southeast of Albany in Shackelford County.

Potential at the well was 224 bbl. of 41°-gravity oil a day through 11/64-in. choke, from conglomerate perforations at 4,262-69, and 4,277-82 ft. Tubing pressure was 800 psi., with gas-oil ratio of 510:1. Location is 330 ft. from south and west lines of Section 18, BAL Survey.

Ellenburger Is New Pay In Montague County

Star Oil Co. 1 Earl Spring has opened Ellenburger production 4½ miles south of Ringgold in Montague County.

Daily potential was 327 bbl. of oil a day through 14/64-in. choke, from perforations at 5,904-12 ft. Gas-oil ratio was 600:1.

Location is in Section 33, Block 4, H&TC Survey. It is immediately south of 5,700-ft. production, but separated by depleted wells.

SOUTHWEST TEXAS

Rich Reservoir Uncovered In Cage Ranch Discovery

Associated Oil & Gas Co. has uncovered a new gas-condensate reservoir in a wildcat test 2 miles southwest of Cage Ranch field, 10 miles south of Falfurrias, in northern Brooks County.

The reservoir, one of two Vicksburg zones found potentially productive, is perforated at 8,266-74 ft. It tested 1,500,000 cu. ft. of gas per day, flowing through 5/32-in. choke with 2,540 psi. Calculated open-flow potential is 5,100,000 cu. ft. per day. Liquid recovery is 136 bbl. per 1,000,000 cu. ft. Liquid is 58.8°-gravity condensate. Shut-in pressure is 3,275 psi.

The other potentially productive pay was perforated at 8,351-72 ft. Tests flowed gas and condensate. Flow was not gaged, but bottom-hole pressure of 2,375 psi. was recorded while flowing. This zone is shut off.

The well, 2-F Cage, in Section 656, I. Lopez Survey, was drilled to 8,550 ft. It is cased to 8,480 ft.

Cage Ranch field was discovered in

1946. Present production is from Vicksburg sands at 7,600 to 8,000 ft.

Hockley Sand Produces As New Pay at Bridwell

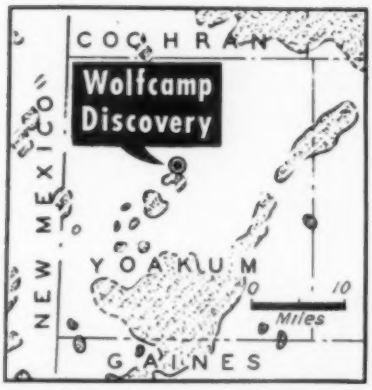
Hockley production has been opened in Bridwell field, 10 miles northwest of San Diego, in northeastern Duval County. Previous production has been from Pettus sand. The field was discovered in 1940.

The Hockley discovery is by C. C. Winn at his 1 Rogers, in J. Potevent Survey, Section 275. Pay is perforated at 3,542-43 ft. Pettus production is from about 4,000 ft.

Winn's discovery well flowed 41.02 bbl. of oil per day through ⅛-in. choke. Flow was with pressure of 650 psi. and gas-oil ratio of 762 cu. ft. per barrel.

It was drilled to 4,326 ft., through the field's Pettus pays. Location is on the north end of the Pettus producing area.

WEST TEXAS



Amerada Petroleum Corp. 1 Abbott has opened Wolfcamp oil ¾-mile north of San Andres production in Brahaney field, north-central Yoakum County. Daily potential was 225 bbl. a day through ¾-in. choke, from pay at 9,028-73 and 9,092-9,116 ft. This was a deep exploration, with total depth 12,491 ft.

TEXAS OFFSHORE

Details Released on Two Mustang Island Wells

Information is released on Mustang Island Block 889 Offshore field, south of Port Aransas from Neuces County. Gulf Oil Corp. 1 Texas State Lease 41338-Block 889, completed last year, took production tests late in July of this year. The well flowed 13,800 M.c.f. of gas per day and distillate. Production is from the Frio at 11,386-11,432 ft.

The second well in this offshore field, drilled directionally from the same platform, flowed 11,300 M.c.f. of gas per day. This well, the 2-A Block 889 Gas Unit Block 889 and 883 Gulf of Mexico, was shut in last November.

A third well has been completed in this offshore Texas field but no details have been released. Completion was in perforations at 12,624-70 ft.

TEXAS PANHANDLE

Tests Under Way at Lipscomb Discovery

Production tests got under way last week at Humble Oil & Refining Co.'s 1 Willis D. Price in the east central part of Lipscomb County. The wildcat, 8 miles north of Higgins in Section 613, Block 43, H&TC Survey, flowed 4,100 M.c.f. of gas per day from Morrow sand perforations at 9,914-28 ft.; it then made 5,631 M.c.f. per day.

Lipscomb County Wildcat Is Tonkawa Discovery

A Tonkawa-Pennsylvanian gas discovery was completed in northwestern Lipscomb County by Sinclair Oil & Gas Co. for 4,900 M.c.f. per day from Tonkawa sand perforations at 6,408-20 ft.

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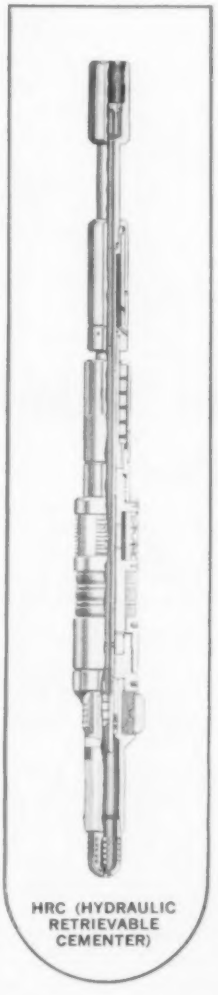
Full opening mandrel permits the pumping of large volumes of fluid with minimum pressure drop, also allows passage of tubing-type perforating gun. Operated by simple tubing manipulation and fluid pressure. Built-in safety joint protection.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HM (Hydro-Mechanical) Type "H" RETRIEVABLE PACKER... A full-opening, heavy duty, hook wall type packer designed to be run on tubing into a cased hole to provide a seal above a section to be fractured, acidized or tested.

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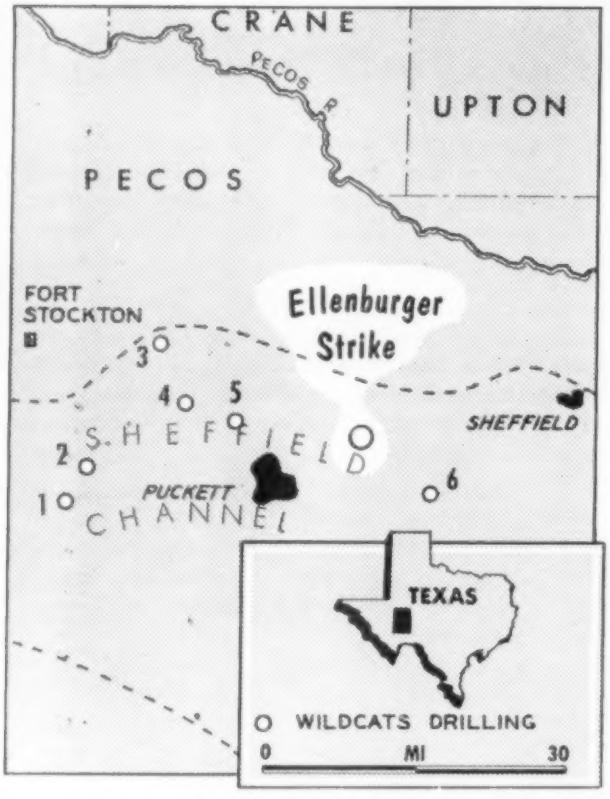

Here are the wildcats drilling and their states (numbered circles)

(1) **Hunt Oil Co.** 52 Elsinore Royalty Co. Location has just been announced and it was in the stage of building roads. Contract depth is 14,000 ft. Location is Section 21, Block D, GC&SF Survey, 15 miles south of Fort Stockton.

(2) **Phillips Petroleum Co.** and Sinclair Oil & Gas Co. 1 Montgomery "A." Location is 13 miles southeast of Fort Stockton, in Section 17, Block 134, T&STL Survey. Drilling is under way on contract depth of 22,000 ft. Great Western Drilling Co. has contract.

(3) **Phillips Petroleum Co.** 1 University "EE," 12 miles east of Fort Stockton in Section 7, Block 24, University Lands. Drilling was below 16,594 ft. on projected depth of 18,500 ft. This well had good gas shows in several sections of the Wolfcamp.

(4) **Pan American Petroleum Corp.** 1 University "CS." This is West Texas' deepest hole, with present permit calling for 22,200 ft.; drilling ahead in shale below 19,455 ft. at last report. Location is Section 27, Block 23, University Lands.

(5) **Phillips Petroleum** 1 Harral "A," Section 6, Block 126, T&STL Survey, 15 miles southeast of Fort Stockton. Drilling was below 8,994 ft. at last report, on 18,000-ft. contract. A test at 7,272 ft. blew gas and recovered 500 ft. of heavily oil and gas-cut mud. Tentative top on the Wolfcamp was 8,138 ft.

(6) **Phillips Petroleum** 1 Harral "B," Section 71, Block B-3, GC&SF Survey, 15 miles south of Bakersfield. Rotary equipment was moving in, for a 13,000-ft. test

What's happening here may pose the question . . .

Are We Entering Delaware Basin by Back Door?

By Carl Hoot

FOR THE past 4 or 5 years, whenever a major oil-company representative was asked about the next possible oil province for the Texas Mid-Continent area, he had two answers. One area was in the Texas and Oklahoma panhandles, north of the Matador uplift, and the other was the Sheffield Channel and Val Verde basin. Most operators think of the latter two as one area, although the channel is sometimes defined as an underground connecting feature between Delaware basin to the northwest, and Val Verde basin on the southeast.

The term major company is used advisedly, especially in the basins of southern West Texas. There, it takes an operator of fair means to assemble lease blocks, let alone the exploration that must be done before drilling. Drilling costs are on a par with all the rest of it, due to the thick Permian sections, and complex faulting such as that found on the southwest flank of Puckett field. As an example of the depths required to test pre-Permian sections, average depth to the Ellenburger at Puckett is near 15,000 ft., but one well drilled past 16,500 ft. without entering the Ellenburger.

Devonian and Ellenburger Prospect

Deep exploration in Sheffield Channel and Val Verde basin got off to a good start this year. Currently there are six active rigs in the drilling, or moving-in stages, and two wells that look like big discoveries.

Ellenburger oil . . . Latest of the discoveries is Standard Oil Co. of Texas 1 Helen Hokit "2," in Section 7, Block 127, T&STL Survey, Pecos County. Location is about 35 miles southeast of Fort Stockton, and nearest production of any kind is Puckett field.

A 2-hour drill-stem test between 11,303-11,423 ft. had gas in 8 minutes, at the rate of 265,000 cu. ft. a day; oil flowed at the daily rate of 740 bbl. a day through ¾-in. choke. Flowing pressure ranged from 325-425 psi., and 4,345 psi. when shut in 30 minutes. At last report, operators were conditioning hole, with total depth at 11,454 ft.

No. 1 Hokit "2" also had light gas shows in the Wolfcamp, and flowed 17,000 M.c.f. of gas a day, plus 4-5 bbl. of distillate an hour, from the Pennsylvanian Strawn.

Terrell strike . . . Magnolia Petroleum Co. was assured of a big Devonian gas discovery at its 1 Brown Bassett, in north-central Terrell County. No. 1 Bassett is now shown on the accompanying map, but is some 35 miles southeast of Sheffield field, in the extreme southeastern portion of Sheffield Channel.

This prospect drilled into the Devonian at 11,943 ft. and hit gas near 12,040 ft. The well blew out and caught fire, destroying the rig. Observers said the color of the flame indicated presence of distillate in the gas. At last report, operators were back in the hole, testing casing. Total depth was 12,407 ft.

Successful Wildcats

ALBERTA

Hudson's Bay 1 East Virginia Hills, LSD 5, 31-65-6w5. TD 8,422 ft. Indicated Gilwood oil well.

Barron Kidd 10-3-38-5 Provost, LSD 10, 3-38-5w4. TD 2,740 ft. Viking gas well.

Texaco A-3-4 Castle River, LSD 3, 4-6-2w5. TD 12,050 ft. Mississippian gas well.

NORTH DAKOTA

Burke County: Northwest Oil Drilling Co. 1 Ed Bunting, S½ SE SW 5-162n-91w. IPF 225 BOPD, Midale discovery, new field. TD 6,640 ft. Mission Canyon.

KANSAS

Graham County: Cook & Galloway and Nate Appleman 1 Kendall "A," NE NE NW 20-7s-25w. IPP 90 BOPD, 10 per cent water, 40°, Lansing 3,844-50 ft. TD 4,202 ft. (Opens Northwest Blazier pool.

Burch Drilling Co. and Joe Nathan 1 Morris, SE SE NW 28-9s-23w. IPP 260 BOPD, 40°, Lansing-Kansas City 3,826-3,921 ft. TD 3,985 ft. Opens Northwest Law pool.

Petroleum, Inc. 1 Vesper, NE NE SE 36-9s-23w. IPP 200 BOPD, 41°, Lansing-Kansas City 3,849-51 ft. TD 4,180 ft. Opens Vesper pool.

NCRA 1 Wheeler, SE NE SW 8-10s-21w. IPP 140 BOPD, 28°, Lansing 3,702-10 ft. TD 3,833 ft. New pool.

Osborne County: Jones-Shelburne & Farmer 1 Worley, SW SW NE 27-10s-15w. IPP 20 BOPD, 10 BWPD, Lansing 3,038-42 ft. TD 3,446 ft. Opens South Ruggles pool.

Ellis County: CRA and J. E. Morris 1 Windholz "C," NW NE SW 32-12s-16w. IPP 13 BOPD, 10 BWPD, 37.2°, Lansing-Kansas City 3,348-53 ft. TD 3,531 ft. Opens Windholz pool.

Russell County: White Eagle Oil Co. 1 Morgenstern, NW SE NE 34-15s-15w. IPP 128 BOPD, 40°, Lansing-Kansas City 3,195-3,319, TD 3,463 ft. Opens West Boxberger pool.

Hamilton County: Kansas-Nebraska Natural Gas Co. 1 Bradshaw, C NW SE 36-22s-41w. IP 1,164 M.c.f. of gas per day, Permian 2,546-62 ft. TD 5,418 ft.

Stafford County: CRA and Birmingham & Bartlett 1 Witt, NE SW SW 22-22s-13w. IPP 20 BOPD, 85 per cent water, Arbuckle 3,828½-33½ ft. TD 3,833½ ft. Opens East Hahn pool.

Kearny County: Excelsior Oil Co. 1 Schaffer, C SW NW 34-25s-36w. IPP 185 BOPD, 27.3°, St. Louis 4,984-97 ft. 5,028-31 ft. TD 5,150 ft.

CRA and Ellis Drilling Co. 1 Hammond "C," SE NE SW 9-25s-14w. IPP 282 BOPD, 36.1°, Lansing 3,924-29 ft. TD 4,355 ft. Opens Hammond pool.

Butler County: Beaumont Petroleum Corp. 1 Phares estate, NE NE NE 5-26s-3e. IPP 25 BOPD, Mississippian 2,757-58 ft. TD 2,843 ft. Opens Phares pool.

Kingman County: Pickrell Drilling Co. 1 Wulf, SE SE NE 3-30s-7w. IPF 2,822 BOPD, 4 per cent water, Mississippi 4,160-80 ft. TD 4,242 ft. Opens South Trenton pool.

Morton County: Panhandle Eastern Pipe Line Co. 1-14 Cunningham, C SE NW 14-31s-41w. IP 866 M.c.f. of gas per day, Morrow 5,359-69 ft. TD 5,577 ft.

Barber County: Iron Drilling Co. 1 A. L. Frisbee "A," SE SE SW 25-33s-10w. IP 3,300 M.c.f of gas per day, Mississippi 4,543-53 ft. TD 4,583 ft. Opens Cedar pool.

Cowley County: Crest Petroleum Co. 1 Waldschmidt "B," NW SW NW 17-34s-6e. IPP 35 BOPD, 58 per cent water, 41.6°, Mississippi 3,025-33 ft. TD 3,083 ft. Opens Waldschmidt pool.

OKLAHOMA

Garvin County: Jake L. Hamon 1 Mays, C NW NW SW 24-3n-1w. IPF 168 BOPD, 35°-gravity, second Bromide sand 4,114-16 ft. TD 5,200 ft.

Beaver County: Carter Oil Co. et al 1-A E. Fickel Unit, 16-3n-25eCM. IP 6,650 M.c.f. of gas per day, Tonkawa sand 5,514-38 ft. TD 7,690 ft.

Comanche County: J. E. Shumake 1 McDaniel, NW 1-4n-12w. IPP 2 BOPD, 36°-gravity, sand 191-348 ft. TD 550 ft.

Beaver County: Cabot Carbon Co. 1 Allan, 25-4n-27eCM. IP 1,500 M.c.f. of gas per day, Council Grove-Permian 3,210-12 ft. TD 7,217 ft. New pay in Highland field.

Pontotoc County: W. O. J. Morris 1 G. L. Hane, NE 36-5n-8e. IPP 4 BOPD, Senora sand 952-64 ft. TD 1,009 ft.

Cleveland County: Anderson-Prichard Oil Corp. 1 Noble Townsite, SE 27-8n-2w. IPF 230 BOPD, Tulip Creek-Ordovician 8,246-49 ft.; McLish 8,402-06 ft. TD 8,462 ft. New pay in Noble pool.

Garfield County: Walter Bendorf 1 Moore, NW NW SW 36-22n-3w. IPF 154 BOPD, 54°, Whitney 1,445-51 ft. TD 2,350 ft. New pay in North Green Valley pool.

Harper County: Midwest Oil Corp. 1 Cooper, C NE SW 13-25n-23w. IP 28,000 M.c.f. of gas per day, Chester-Mississippi 7,208½-18½ ft.; 7,724-25 ft. TD 7,490 ft.

Woods County: Amerada Petroleum Corp. 1 Krob, 24-25n-13w. IPF 382 BOPD, 22 BWPD, 37.2°, 190 M.c.f. of gas, Simpson 7,060-90 ft. TD 7,451 ft.

Kay County: J. D. Morgan Producing Co. 1 Chilocco, SW SW NE 14-29n-2e. IPF 672 BOPD, 38°, Red Fork-Pennsylvanian 3,368-87 ft. TD 3,480 ft.

EAST TEXAS

Anderson County, new pay in Bethel field. The Texas Co. 1 E. C. Walton, T. H. Kingsley League, A-450, J. N. Acosta Sur., A-1, 7 mi. NW Tennessee Colony. IP 20,500 M.c.f. gas, calculated open flow, plus estimated 21 bbl. 53-gravity condensate per 1,000 M.c.f., Rodessa 8,260-83 ft. Shut-in tubing pressure 3,425 psi. TD 9,043 ft.

Marion County: Great Expectations Oil Co. and Amerada Petroleum Corp. 1 Issie Segal, James Wimberly Sur., 14 mi. W Jefferson. IP 541 BOPD, 41-gravity, ¼-in., TP 500 psi., GOR 385, Pettet perforations 7,333-45 ft., TD 7,568 ft., elev. 263 ft., top Pettet 7,460 ft.

TEXAS GULF COAST

Aransas County: Tidewater Oil Co. et al 1 State, Tract 124, Aransas Bay. IP 4,000

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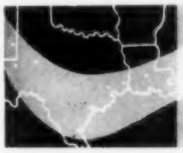

Associated Brine Industries

COMPANY	PRODUCING POINTS
Brine Service Div., Corpus Christi Salt Co.	Beaumont, Tex.; Pine Prairie, La.
Brine Service Co.	Houston, Corpus Christi
Toland Brine Service, Inc.	Kermit, Tex.
The Brine Co.	Midland, Tex.; Hobbs, N. M.

M.c.f. daily, estimated open-flow potential, GIR 45.6 M.c.f. per bbl., 64.4°, shut-in pressure 4,440 psi., perforations 9,360-65 ft. (Frio). TD 10,500 ft. (Second well and new pay Half Moon Reef field.)

Slick Oil Corp. 1 Werland, Section 52, Block 1, 6th Taft Farm Lands Subdivision. IP 2,500 M.c.f. daily and 115 BCPD, 7/32-in., TP 3,200 psi., perforations 9,489-93 ft. TD 9,902 ft. (New pay in Mud Flats field.)

Bee County: Mim Oil Co. et al 1-A Holzmark, James A. York Sur. (8 miles northwest of Beeville). IPP 36.45 BOPD, 38°, perforated 3,405-08½ ft. (Hockley). TD 4,315 ft. (New oil reservoir on northwest flank of Holzmark field.)

Harris County: Armour Properties and Wesley West 1 Davis Unit 1, Wiley S. Powell Sur., A-622. IP 151.90 BOPD, 9/64-in., GOR 632 cu. ft. per bbl., TP 880 psi., perforations 6,695½-98½ ft. (Yegua). TD 7,499 ft. (New oil discovery 3,300 ft. north of Fairbanks field.)

Jackson County: H. H. Howell 1 Drushell et al, Carlos Lasso Sur., A-40 (4 miles southwest of Edna). IP 13,100 M.c.f. daily, absolute open-flow potential, 28.6 BC per M.M.c.f., 60°, shut-in pressure 2,652 ft., perforations 6,347-50 ft. (Frio). TD 6,390 ft. (New pay in Lasso area.)

Lavaca County: Skinner Corp. and H. R. Smith 1 Cox, P. Salinas Sur., A-419. IP 25,000 M.c.f. daily, absolute open-flow potential, GLR 264 M.c.f. per bbl., 65.8°, shut-in pressure 1,574 psi., perforations 3,825-30 ft. TD 5,373 ft. (New field—3 miles northwest of Dinero.)

Live Oak County: A. A. (Bus) Moore 2 Meyer, Refugio CSL Sur., A-399 (5½ miles northwest of Tynan). Shut-in gas well, no gage, perforations 3,746-56 ft. and 3,759-61 ft. (Frio). TD 3,775 ft. (New pay in unnamed gas area.)

Madison County: Woodley Petroleum Co. and Moran Corp. 1 Fred Hendrix, Antonio Del Rios Sur., A-26 (4 miles southwest of Madisonville). IP 211.4 BOPD, 7/32-in., 35.8°, GOR 1,313 cu. ft. per bbl., TP 650 psi., perforations 8,824-32 ft. and 8,836-44 ft. (Sub-Clarksville). TD 10,512 ft. (New oil field.)

Matagorda County: Arkansas Fuel Oil Corp. 1 Crouch, John Crier Sur. 7, A-19 (8 miles northwest of Bay City). IP 89 BOPD, 7/64-in., 30°, GOR 1,060 cu. ft. per bbl., TP 600 psi., perforations 6,117-19 ft. TD 8,515 ft. (New field.)

Wharton County: John B. Coffee 9-C Kountze & Stewart, Morris & Cummings Sur. 15 (15 miles southwest of El Campo). IP 130,000 M.c.f. daily, absolute open-flow potential, GIR 52.5 M.c.f. per bbl., 58.9°, shut-in pressure 2,486 psi., perforations 6,729-33 ft. TD 6,905 ft. (New pay in East Mauritz field.)

SOUTHWEST TEXAS

Dimmit County: W. J. Steeger et al 1 Armstrong, I&GN Sur., A-161, Block 1, Section 12 (½ mile southeast of Brundage). IPP 65.03 BOPD (net), 37°, 55 per cent water, perforations 4,205-11 ft. (Olmos). TD 4,502 ft. (New field.)

Duval County: Concord Oil Co. and H. H. Howell 1 Vaello et al, San Andres Grant, A-657. IP 130 BOPD, ⅛-in., 42.6°, GOR 590 cu. ft. per bbl., TP 785 psi., perforations 5,525-34 ft. (Yegua). TD 6,301 ft. (New oil reservoir in Benavides area.)

Jim Wells County: Katz Oil Co. 1 Knolle Farms, Block 54, J. B. Dibrell Subd. of Wade Ramon, Casa Blanca Grant. IP 91.23 BOPD, 5/32-in., GOR 379 cu. ft. per bbl., TP 180 psi., perforations 4,898-4,912 ft. (Frio). TD 5,928 ft. (Second well, new pay, and first oil production in new Dun area.)

WEST TEXAS

Dawson County: Humble Oil & Refining Co. 1 R. E. Britt, Labor 16, League 3, Taylor CSL, 9 mi. NW Lamesa. IPP 157 BOPD, 35-gravity, GOR 189, Spraberry 7,396-7,410 ft., TD 10,584 ft., PB 7,447 ft. Ground elev. 3,020 ft.

Gaines County, Canyon discovery in Robertson, N. field. J. D. Wrather, Jr., Humble Oil & Refining Co. 3-D Northrup, 327-G-CCSD&RGNG. Dual completion. Canyon perforations 8,872-8,914, 8,944-52 ft., IPP 221 BOPD, 46-gravity, GOR 275. Clear Fork, regular pay, perforations 6,984-7,196 ft. IPP 199 BOPD, 37-gravity. TD 10,202 ft.

Lubbock County: Pure Oil Co. 1 Edmisson, 29-A-GC&SF, 4 mi. N Lubbock. IPP 43 BOPD, 28-gravity, Clear Fork 5,143 ft. TD 11,202 ft., PB 5,227 ft. Top Ellenburger 11,030 ft., elev. 3,248 ft.

Reagan County: Ross Brunner 1-12 University, 9-12-University Lands, 5½ mi. SW Big Lake. IP 316 BOPD, 26/64-in., 43-gravity, GOR 928, TP 135 psi., Fusselman pay 9,411-19, 9,424-40 ft. TD 9,805 ft., elev. 2,758 ft.

OHIO

Coshocton County: Busk & Walters 1 Burl Walters, Sec. 13, Bedford Twp., Clinton sand 3,334-84 ft. IP 400 M.c.f. of gas and 15 bbl. of oil per day. TD 3,409 ft.

WYOMING

Niobrara County, Coronado Petroleum Co. 3 Government-Hendrickson, SE NE NE 8-36n-62w. IPP 15 BOPD, Minnelusa discovery, new field. TD 1,530 ft.

"I don't like my cookin' either—but I don't sit around and gripe about it."

THE OIL AND GAS JOURNAL

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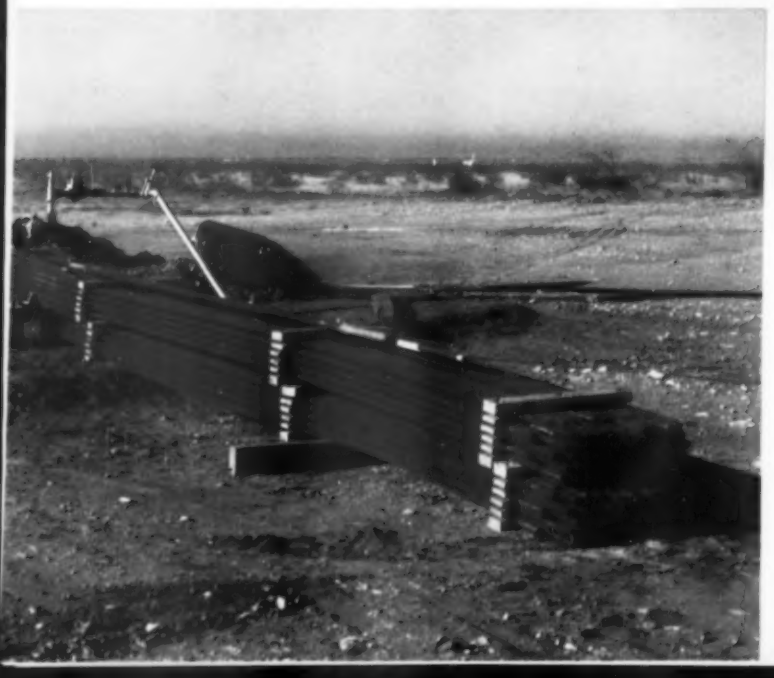

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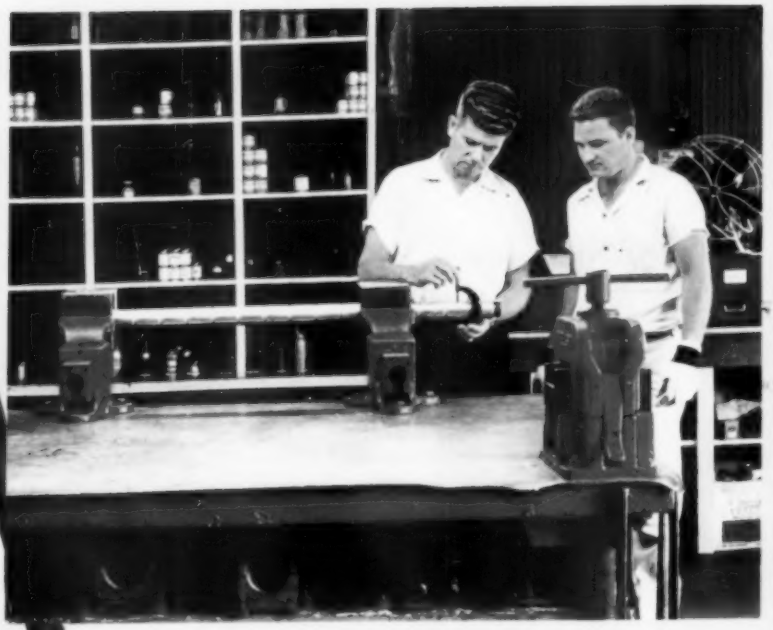

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36-1

Mellower, but still confident:

McCarthy Readies New Search

SURROUNDED by memories of a lost oil empire, Glenn H. McCarthy is dusting off old maps in search of wildcat territory in which to pour remnants of a once-great fortune.

Now back from an unprofitable oil-hunting expedition in Bolivia, McCarthy has announced plans to resume operations in this country. He's out to prove to the world—and a man named McCarthy—that he's still the greatest wildcatter of them all.

McCarthy made his share of enemies and some say he drew more than his share of accusations during his reckless reign at the top of the heap. But you can look in vain for the man who ever accused him of being a conformist.

Opposes trend . . . Now, while independents and major oil companies alike are flocking to promising oil regions in distant lands, McCarthy is back in Houston intent on making another fortune in domestic oil.

McCarthy himself isn't talking of rebuilding a personal fortune. Rather, he speaks of doing all he can to make stockholders of Glenn McCarthy, Inc., "reap something from their investment, if it's possible."

Peering through dreamy eyes which obviously have seen better years, the tousle-headed wildcatter explains his new mission in simple terms: "I'm interested in finding more oil in the United States." Then he adds, almost defiantly: "I think it can be done."

McCarthy claims no Midas touch in this or any other venture. He says he never found a way "to make easy money."

"Most people who think all opportunity is gone," he concludes philosophically, "are wrong. The problem is—it's hard to find anybody who wants to work. There's plenty of opportunity."

Modest plans . . . By his previous standards, McCarthy's new venture will be a small-scale operation. He admits that his recent retreat from Bolivia was the salvation of the company he heads.

Glenn McCarthy, Inc., received a modest $1,500,000 from a group headed by Tennessee Gas Transmission Co., which took over the 900,000-acre Bolivian concession. The company is to receive a similar sum if and when the new concession holders establish oil or gas production on a commercial basis.

In pulling out of South America the McCarthy company abandoned its potentially great oil discovery in the Bolivian hinterland. McCarthy estimates that he uncovered anywhere from 100 to 300 million barrels of oil in Bolivia. He failed, though, because he was unable to raise the money to develop the concession, produce the oil, and get it to market.

GLENN McCARTHY

. . . the opportunity is there.

Recently, McCarthy announced that his company had assets of well over $1,000,000. Its present capital won't go far in looking for new oil reserves. But he hopes it will go far enough to get his ailing company on its feet economically.

The domestic oil industry is perhaps even more competitive today than it was when he lost his first fortune and his proud Shamrock Hotel, which a few years ago was symbolic of "Texas oil millionaires." But McCarthy thinks he has a formula for success which will work today much as it worked a decade ago. "It requires work," he says, "and intelligent work." At 49, the hard-jawed Texan still has an abundant supply of both energy and brains.

McCarthy has not yet announced where his new operations will be centered, but he is known to be looking over numerous prospects. He says he plans also to try again in foreign fields. But next time, he says, McCarthy, Inc., will find itself a partner before going to another land in search of oil.

"A foreign operation requires a tremendous amount of cash," McCarthy says. "And," he adds, "this company doesn't have it . . . We knew it would cost us more money than we had in the beginning to operate in Bolivia."

He blames the failure to raise money on the unexpected delay in getting the stock of his company cleared for public sale.

In domestic operations, McCarthy points out, a company can more readily limit its total investment. It's easier to establish small-scale production which, if luck holds out, will keep your creditors at a discreet distance while you continue looking for big oil.

The man . . . McCarthy was born at Beaumont, Tex., on Christmas Day, 6 years after nearby Spindletop proved that wildcatting could be a money-making proposition. McCarthy was nurtured by the spirit of Spindletop. With the daring success formula which paid off for Lucas at Spindletop, McCarthy later was able to build his own dream world, complete with the luxurious hotel which served for a time as his private club.

Today, as compared with the McCarthy of old, he is a mellow man.

Sitting in his office a few blocks from the hotel now known as the Shamrock Hilton, McCarthy can stare through the traditional dark glasses at some of the mementos salvaged from an earlier day. The walls of his office are lined with three pictures of the Shamrock. Also prominently displayed are two large portraits of a legendary wildcatter whose initials "G. H. M." are emblazoned on the battered wastebasket beside his desk.

But McCarthy is not living in the past. In his office also can be found an architect's drawing of a luxurious hotel-type structure. According to rumor, it will be even more glamorous than the Shamrock.

Audley E. Harrisberger has been elected president of Pure Transportation Co., subsidiary of Pure Oil Co. Harrisberger succeeds **J. W. Meehan,** who recently resigned to join Derby Refining Co. as vice president in charge of transportation and crude-oil supply.

Rex Shaver, formerly president of H. L. Rowley, Inc., has joined Rimrock Tidelands, Inc., as assistant to the president. He will headquarter in New Orleans and will coordinate the company's drilling activities and act as the president's representative in the Gulf Coast area. Shaver entered the oil industry in 1935 with The Texas Co. He joined Big Chief Drilling Co. in 1948, and became president of H. L. Rowley, Inc., in 1956.

Personals

A. E. PECORE

A. E. Pecore, vice president of Humble Pipe Line Co., has been named to succeed **O. Q. Lomax** as president of the company. Lomax, president since 1950, has retired. **William S. Spangler,** general superintendent, will move up to replace Pecore as vice president. **P. D. Phillips, Jr.,** assistant general superintendent, has been elected a director and promoted to general superintendent, succeeding Spangler. Pecore joined Humble Pipe Line in 1919. He became chief engineer in 1944, general superintendent in 1949, and vice president in 1950. Spangler has been general superintendent of the company since 1951 and was elected a director in 1955. Phillips, new general superintendent, has been with the company since 1934. He was named chief engineer in 1951 and became assistant general superintendent last year.

W. S. SPANGLER

P. D. PHILLIPS

Clyde D. Alstadt, supervisory engineer in the gas engineering department of Columbia Gas System Service Corp., has retired. Alstadt has been with the Columbia System since 1917. He has served with many system companies and was at one time vice president of Virginia Gas Transmission Corp. and Atlantic Seaboard Corp.

Dave Clayton, Mason Downing, Ed Morin, Jim Ulsh, and **Dick Wilson** have been named staff engineers for Esso Research & Engineering Co. They will be assigned to Esso's European staff which provides engineering services to affiliated companies. Esso announced plans to open a European branch office several months ago. Its site has not been chosen. Clayton and Ulsh will have staff responsibilities for engineering activities in England and Ireland. Downing has been assigned to Belgium, France, and Italy; Morin, to Germany and Rotterdam; Wilson, to Norway.

G. C. Johnson has been appointed research associate at the Paulsboro, N. J., laboratory of Socony Mobil Oil Co., Inc.

Thomas D. Rush has resigned as geologist with The Texas Co.'s Houston exploration and development department, to become a consulting geologist there.

Lloyd J. Waner, Jr., geologist, has been transferred by Gulf Oil Corp. to Oklahoma City from Ardmore, Okla.

L. D. Hillyer, production geologist with Shell Oil Co., has been appointed senior production engineer in Houston. **E. G. Jackson, Jr.,** junior exploitation engineer in Houston, has been transferred to Corpus Christi as exploitation engineer.

William H. Moody, petroleum engineer with The California Co., has been transferred to Maracaibo, Venezuela, as drilling engineer with Richmond Exploration Co. Moody had been in Lafayette, La., since 1955.

G. B. Ryan, coordinator of commercial research development in the manufacturing department of Standard Oil Co. (Ohio), has been named staff assistant to the Gulf Coast division manager, production department. He will transfer to Houston from Cleveland. **George L. Lupfer,** supervisor of the economics section of manufacturing operations in Cleveland, will succeed Ryan as coordinator of commercial research development.

J. L. Sleeper, Jr., assistant division geologist in The Texas Co.'s West Texas division at Fort Worth for the past year, has been named staff geologist of the domestic producing department with headquarters in New York. A graduate of Baylor University and Texas Technological College, Sleeper has been with Texaco since 1941.

Milo M. Brisco, a director of International Petroleum Co., Ltd., and formerly company executive representative in Colombia, has been elected executive vice president. Brisco joined an International subsidiary in Colombia in 1935. He became general manager of operations in Peru in 1953 and executive representative in charge of Colombian operations in 1955. He was elected a director of International in May.

R. Rea Jackson, general manager of the manufacturing department of Socony Mobil Oil Co., Inc., and chairman of its manufacturing committee, has been appointed chairman of the coordination committee. He succeeds **Frederic R. Pratt,** who has retired. **Thomas P. Simpson,** vice president and director of manufacturing for General Petroleum Corp., Socony's western affiliate, will succeed Jackson as general manager of the manufacturing department and chairman of the manufacturing committee. Jackson joined Magnolia Petroleum Co., Socony's southwestern affiliate, in 1923 as a chemist. He was later manager of the company's Paulsboro, N. J., refinery. Simpson was director of research and development at the company's laboratories before becoming General Petroleum vice president in 1953.

T. P. SIMPSON

R. R. JACKSON

D. S. Godshalk, Continental Oil Co.'s superintendent of operations for the geophysical section since 1953, has been promoted to assistant manager of the geophysical section. He will transfer to Houston from Ponca City, Okla. Godshalk has been with Conoco since 1940. He is a graduate of the University of Oklahoma.

Frank X. Jordan, programing specialist in the Interior Department's Office of Oil and Gas, has joined Independent Petroleum Association of America in Washington as petroleum analyst. Jordan joined the Office of Oil and Gas in 1952. He was with the U. S. Bureau of Mines and Phillips Petroleum Co. before that time.

Charles E. Putman, Jr., has been named by Lone Star Gas Co. to its newly created post of field superintendent of the compressor department. Putman formerly was superintendent of the company's Joshua, Tex., compressor station. In his new job, Putman will supervise and coordinate operations of all transmission, field, and underground gas-storage compressor stations operated by Lone Star in Oklahoma and Texas. Replacing him as Joshua station superintendent is **Seth Davis. Harold C. Brawner** has been named assistant superintendent of the station.

Winston S. Peeler has been elected vice president in charge of manufacturing and a director of American Oil Co. He succeeds the late Dr. Harold R Snow. Peeler has been general manager of manufacturing for the company since February. **Walter T. Herget,** manager of operations in the manufacturing department in New York, will move up as general manager of manufacturing succeeding Peeler. Peeler has been with the company since 1934. He became operating superintendent of

W. S. PEELER

W. T. HERGET

Amoco's Texas City refinery in 1952 and general superintendent in 1953. Herget was head of the company's chemical department and general superintendent of the Yorktown, Va., refinery before being named manager of operations in the manufacturing department last year. In his new position he will coordinate operations of the company's six refineries at Texas City, Yorktown, El Dorado, Ark., Destrehan, La., Savannah, Ga., and Baltimore.

John Simons, district geologist for Tennessee Gas Transmission Co. in Salt Lake City, has been appointed manager of the company's new Durango, Colo., exploration district. Also assigned to the new Durango district are **C. S. Algire,** geologist, and **J. D. Moon,** district landman. **A. N. McDowell,** Gulf Coast division exploration manager in Houston, has transferred to Calgary as manager of the Canadian exploration division. **J. P. Roach,** staff geologist in Houston, replaces McDowell as Gulf Coast exploration manager. In other changes in Houston, **J. Spencer Collins** has moved up from staff geologist to staff manager. **J. M. Browning,** formerly district exploration manager in Calgary, has been transferred to Houston as staff geologist; and **L. B. Vaden** and **George Burgher,** staff landmen, have been appointed land activities supervisors. Outside the Houston district, **Robert N. Grace** has been named district geologist in Salt Lake City. **Jack Morris** has been appointed district exploration manager in Denver, and **Ray Marvin** has been named Denver district geologist. **Tom Perryman** has been named district landman in Midland, Tex.

Fred B. Asche, Jr., has joined Tekoil Corp.'s administrative staff in Dallas.

H. M. Baud, reservoir engineer with Shell Oil Co., has been transferred to Midland, Tex., from Houston.

Woodrow W. Mize has been named manager of Odessa Butadiene Co.'s Odessa, Tex., plant.

Bruce Nelson has joined Shell Oil Co.'s Martinez, Calif., laboratory as research technologist.

Frank C. Pfeiffer, Jr., gas engineer with Magnolia Petroleum Co., has been transferred to Alice, Tex., from Falfurrias, Tex.

Joseph W. Lea has been promoted by Sun Oil Co. from senior geologist in Dallas to regional geologist in charge of the company's eastern region. **Dr. Edward W. Hard,** eastern region geologist since 1949, has been named western region geologist. Hard succeeds **Wallace Ralston,** who recently was appointed assistant division chief geologist-operational. Lea has been with Sun for 21 years. He became senior geologist in Dallas in 1955. Hard joined the company in 1937 and was named regional geologist in 1949.

Loren L. Ware, assistant division manager of Sinclair Oil & Gas Co.'s Midland, division, has been appointed general superintendent of exploration for the company and transferred to Tulsa. Ware joined the company in 1944. He was division exploitation geologist in 1951, later was named division exploration superintendent of the Texas-New Mexico division. **Robert L. Elston,** Tulsa division exploration superintendent, will succeed Ware as assistant manager at Midland. Elston has been with Sinclair since 1952 and was with Sun Oil Co. before that time. He was appointed division exploration superintendent in 1954.

Stanley D. Breitweiser has resigned as vice president and a director of Vickers Petroleum, Inc., to join D-X Sunray Oil Co. as vice president in charge of marketing, a new position. He will report to **T. E. Fitzgerald,** executive vice president in charge of marketing.

Warren W. Mankin, district engineer for New Mexico Oil Conservation Commission at Santa Fe, has joined Aztec Oil & Gas Co. as chief engineer.

Personals

H. H. CHANDLER

H. H. Chandler has been appointed deputy shareholder's representative for The Texas Co. in London. Chandler has been superintendent of the company's Eagle Point refinery at Westville, N. J., since 1955. **V. K. Brandenburg,** assistant superintendent of Texaco's Lawrenceville, Ill., refinery, will succeed Chandler as superintendent at Westville. Brandenburg was assistant superintendent at Texaco's Casper, Wyo., and West Tulsa refineries before transferring to Lawrenceville last year. **C. T. Swan,** assistant superintendent at the Casper refinery, has been transferred to Lawrenceville to replace Brandenburg. **G. A. Collins, Jr.,** assistant supervisor of the refinery production division in New York, has moved up to succeed Swan as assistant superintendent in Casper.

Charles Dennis has joined the staff of Russell Engineering Co., Abilene, Tex., as water-flood engineer. Dennis was formerly with Phillips Petroleum Co. in Odessa, Tex.

DEATHS

William James Brundred, 74, prominent Pennsylvania oil man, died August 31 in Oil City, Pa. Brundred entered the oil-producing business in 1904 as a partner in Brundred Brothers, a company which pioneered oil-producing operations using air injection. He was later president of Brundred Oil Corp., which specialized in secondary recovery. He was a director of Independent Petroleum Association of America and a former director of Pennsylvania Grade Crude Oil Association.

Robert F. Schermerhorn, 49, Dallas, chairman of the board of Schermerhorn Oil Corp., died recently in Dallas. Schermerhorn was the son of the late J. B. Schermerhorn, founder of the producing firm. A brother, **Edwin J. Schermerhorn,** Tulsa, is president of the company.

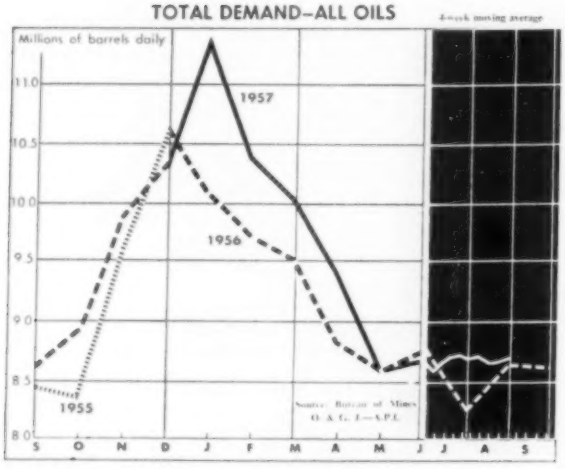
Charles Spencer Warren, 64, retired division superintendent with Cities Service Oil Co., died September 3 in Montgomery, Ala. Spencer moved to Montgomery from Bartlesville, Okla., after his retirement in 1954.

Latest Figures . . . Industry Trends

A QUICK LOOK AT THE HIGHLIGHTS

	LATEST WEEK	Change from WEEK AGO		Change from YEAR AGO	
Production	6,804,750	DOWN	14,800	DOWN	301,495
Crude stocks	287,678,000	UP	1,060,000	UP	10,771,000
Completions	1,096	UP	21	UP	6
Refinery runs	8,327,000	UP	357,000	UP	229,000
Gasoline stocks	171,683,000	DOWN	214,000	DOWN	3,888,000
Kerosine stocks	34,114,000	UP	895,000	UP	1,713,000
Distillate stocks	154,237,000	UP	4,566,000	UP	15,788,000
Residual stocks	52,472,000	UP	235,000	UP	5,689,000
Four-product stocks	412,506,000	UP	5,482,000	UP	19,302,000
Total imports	1,477,500	DOWN	132,300	UP	109,200

TOTAL DEMAND—ALL OILS



Weak Product Markets Reflect Small Gains in Domestic Demand

DOMESTIC DEMAND for petroleum products has been disappointing so far this year. The Petroleum Economics Branch of the Bureau of Mines has just released production and demand figures for June and the first half of the year.

Complete figures for the first 6 months show that domestic demand for all petroleum products averaged only 6,000 bbl. daily more than for the first half of 1956. The total was 8,929,000 bbl. daily for 1957 compared with 8,923,000 bbl. daily for 1956.

Mild weather in the first quarter of this year prevented major gains in demand for heating oils. Cool weather in the early weeks of the second quarter last year created a demand for distillate fuels that could not be topped this year. Also, sharp gains in distillate inventories early this summer pointed to lower prices during the off-season months. With prospects for lower prices good, consumers and secondary suppliers bought very little summer-fill distillate in June.

The combination of these two conditions in the second quarter resulted in a decrease in demand for middle distillate of 111,000 bbl. daily compared with the second quarter of 1956.

Domestic demand for gasoline was up 119,000 bbl. daily in the first quarter and down 33,000 bbl. daily in the second quarter compared with the previous year. The result was a first-half gain in gasoline demand of only 57,000 bbl. daily.

Current figures show a gasoline demand gain of about 6.0 per cent for July but a smaller increase for August.

Distillate markets are soft . . . Middle-distillate stocks are up almost 17,000,000 bbl. over last year. Prices tend to reflect the surplus. There was a small flurry of buying in the North Central area during a short period of cool weather at the end of August, but it didn't last.

Formal price quotations do not reflect actual market conditions. For example, some suppliers on the Gulf Coast are quoting 9.0 cents a gallon as a cargo price for No. 2 fuel. However, there is a market rumor in the area that a large unbranded diistributor was offered No. 2 at 8.5 cents a gallon and he didn't take it.

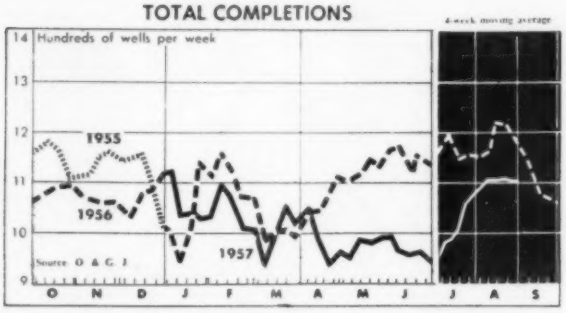
In past years, sales of distillate fuel have increased in the last half of August. Most of the gain could be credited to jobber promotion, aimed at getting consumer tanks filled before the first period of cold weather.

Demand for distillate fuels for the week ended August 23 was the highest since May. Primary suppliers are watching records of sales as well as prices. They need a few big weeks in September.

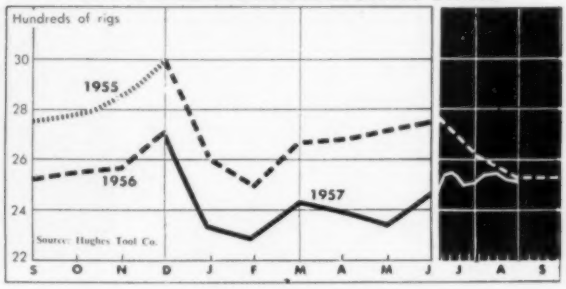
CHANGES IN DOMESTIC DEMAND
1957 over 1956
(Thousands of barrels daily)

	First quarter	Second quarter	First half
Gasoline	119	—33	57
Kerosine	—28	—28	—30
Distillate	38	—83	—25
Residual	—36	—37	—35
Jet fuel	78	2	29
Lubricants	3	—9	—2
Asphalt and road oil	—8	—22	—16
Still gas	15	6	10
L.P.G.	1	—13	—6
Other	32	18	24
Total	212	—199	6

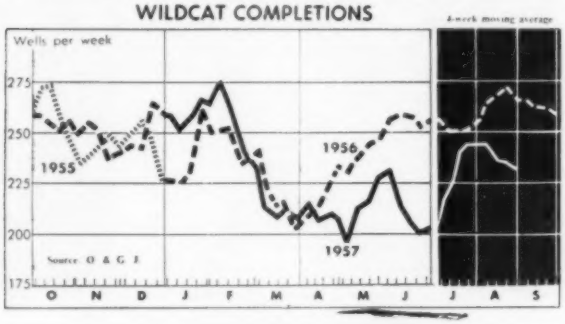
TOTAL COMPLETIONS



ROTARY RIGS OPERATING IN UNITED STATES



WILDCAT COMPLETIONS



ACTIVE ROTARY RIGS*

Area—	9-2-57	8-26-57	9-3-56
North Central and East	115	106	126
Southeast	47	43	36
Okla., Kans., Ark., Mo.	423	426	448
Louisiana	439	455	440
North and East Texas-Panhandle	351	343	367
Gulf and South Texas	198	210	235
West Texas-New Mexico	538	523	477
Rocky Mountain	300	297	281
Pacific Coast	100	105	113
Total United States	2,511	2,508	2,523
Canada	195	192	264

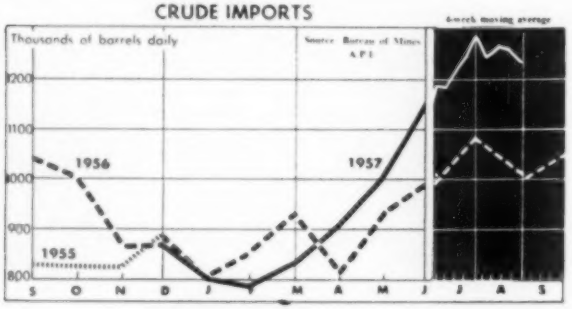
*Hughes Tool Co.

WEEKLY WELL COMPLETIONS . . . WEEK ENDED AUGUST 31, 1957

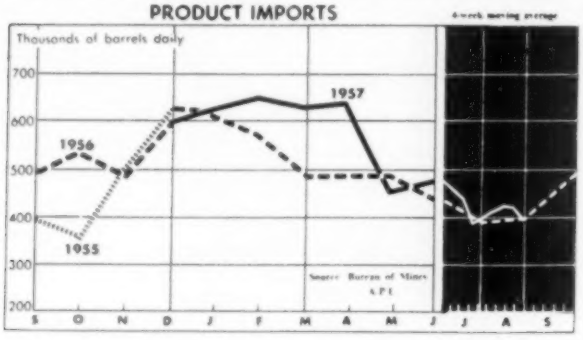
	Total wells							Cumulative		Total wildcats					Cumulative	
	Total	Crude	Cond.	Gas	Dry	Service	Footage	1957	1956	Total	Crude	Cond.	Gas	Dry	1957	1956
Alabama	0	0	0	0	0	0	0	62	‡75	0	0	0	0	0	20	‡33
Arkansas	18	12	0	0	6	0	47,138	725	575	2	0	0	0	2	131	124
California	44	30	0	0	14	0	253,282	1,432	1,477	12	4	0	0	8	356	337
Colorado	13	0	0	2	11	0	60,895	561	779	10	0	0	0	10	381	401
Illinois	60	20	0	0	40	0	137,269	1,706	2,576	14	0	0	0	14	435	506
Indiana	26	8	0	0	18	0	48,219	425	440	4	0	0	0	4	84	91
Kansas	101	49	0	5	47	0	371,071	2,805	3,418	18	2	0	0	16	563	723
Kentucky	38	14	0	1	23	0	42,996	959	1,213	9	0	0	0	9	191	288
Louisiana	61	35	0	4	22	0	343,844	2,501	2,572	10	2	0	1	7	445	519
North	29	19	0	0	10	0	91,361	887	1,099	3	0	0	0	3	117	173
South	29	15	0	4	10	0	229,028	1,151	1,182	7	2	0	1	4	270	292
Offshore	3	1	0	0	2	0	23,455	463	291	0	0	0	0	0	58	54
Michigan	12	5	0	1	6	0	32,869	276	297	2	0	0	0	2	101	111
Mississippi	16	3	1	2	10	0	152,023	252	297	9	1	0	0	8	135	141
Montana	13	5	0	4	4	0	37,375	269	286	3	0	0	0	3	96	105
Nebraska	13	5	0	0	8	0	81,016	590	680	6	0	0	0	6	325	331
New Mexico	49	22	0	12	15	0	245,230	1,410	1,316	9	0	0	1	8	190	176
Northwest	25	8	0	11	6	0	117,037	569	538	5	0	0	0	5	72	55
Southeast	24	14	0	1	9	0	128,193	841	778	4	0	0	1	3	118	121
New York	9	4	0	0	0	5	9,250	306		0	0	0	0	0	4	
North Dakota	0	0	0	0	0	0	0	176	171	0	0	0	0	0	76	53
Ohio	33	12	0	9	9	3	82,791	743	692	0	0	0	0	0	9	6
Oklahoma	137	79	2	5	47	4	478,055	4,162	5,767	18	2	0	2	14	474	598
Pennsylvania	0	0	0	0	0	0	0	442	†754	0	0	0	0	0	39	†17
Texas	416	240	9	22	145	0	1,734,667	14,548	15,082	80	6	1	1	72	3,560	3,821
Dist. 1	12	7	0	0	5	0	32,691	832	*2,172	4	2	0	0	2	291	*730
Dist. 2	16	4	2	1	9	0	93,151	512	*1,789	7	0	1	0	6	194	*576
Dist. 3	29	9	3	1	16	0	211,384	1,162		7	1	0	0	6	337	
Dist. 4	25	9	3	1	12	0	122,538	941		8	1	0	0	7	317	
East	30	19	0	0	11	0	142,877	865	776	8	0	0	0	8	252	284
Dist. 7-B	46	21	0	1	24	0	166,266	1,899		16	0	0	0	16	677	
West	122	105	0	1	16	0	529,118	4,136	4,046	9	2	0	0	7	597	642
Dist. 9	105	52	0	4	49	0	318,329	3,234	*5,397	21	0	0	1	20	823	*1,510
Dist. 10	31	14	1	13	3	0	118,313	967	902	0	0	0	0	0	72	79
Utah	3	1	0	0	2	0	19,723	136	85	2	0	0	0	2	74	51
West Virginia	8	0	0	7	1	0	28,022	425	440	1	0	0	0	1	20	13
Wyoming	23	10	0	3	10	0	132,275	568	554	6	0	0	0	6	194	151
Miscellaneous (Nev.)	3	0	0	0	3	0	11,717	68	70	3	0	0	0	3	51	62
Total U. S.	**1,096**	554	12	77	441	12	4,349,727	35,547	39,616	**218**	17	1	5	195	7,954	8,658
Total prev. week	1,075	548	11	53	446	17	4,177,858			229	13	2	2	212		
Cumulative 1957	35,547	18,442	324	2,558	13,490	733	147,116,192			7,954	817	66	286	6,785		
Western Canada	54	43	0	3	8	0	263,714	2,047	1,994	10	1	0	2	7	580	

*Districts: 2 & 3, 1 & 4, 9 & 7-B, formerly combined. †Incl. New York. ‡Incl. Florida and Georgia.

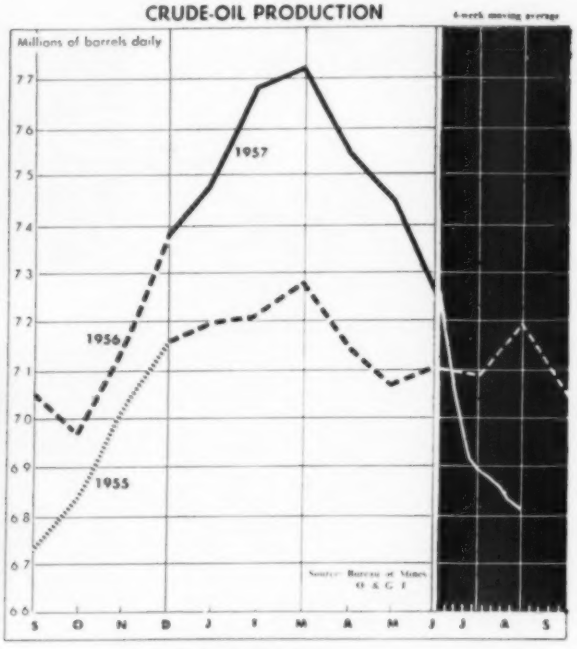
CRUDE IMPORTS



PRODUCT IMPORTS



CRUDE-OIL PRODUCTION

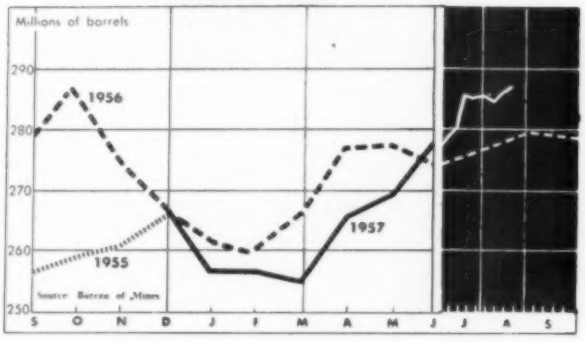


DAILY AVERAGE PRODUCTION FOR WEEK

	August 31, 1957 Crude oil	Lease condensate	Total	Aug. 24 total
Alabama	15,500	.....	15,500	13,750
Arkansas	80,750	250	81,000	85,600
California	923,800	.....	923,800	924,100
Colorado	149,400	.....	149,400	151,150
Eastern	53,000	.....	53,000	52,300
Florida	1,300	.....	1,300	1,300
Illinois	162,200	.....	162,200	165,500
Indiana	29,700	.....	29,700	29,500
Kansas	†338,450	.....	†338,450	†339,400
Kentucky	39,100	.....	39,100	39,400
Louisiana	723,200	72,800	796,000	795,500
North	123,200	2,800	126,000	125,500
South	600,000	70,000	670,000	670,000
Michigan	25,100	.....	25,100	25,900
Mississippi	103,800	4,400	108,200	108,200
Montana	75,200	.....	75,200	76,450
Nebraska	54,000	.....	54,000	52,100
Nevada	100	.....	100	100
New Mexico	244,100	3,900	248,000	249,700
North Dakota	38,100	.....	38,100	31,100
Oklahoma	†552,800	.....	†552,800	†565,400
Texas	2,760,000	53,700	2,813,700	2,813,700
Dist. 1	51,000	450	51,450	51,450
Dist. 2	126,000	8,450	134,450	134,450
Dist. 3	404,000	26,400	430,400	430,400
Dist. 4	210,000	6,200	216,200	216,200
Dist. 5	36,000	300	36,300	36,300
Dist. 6	122,000	6,300	128,300	128,300
East Texas Field	173,000	.....	173,000	173,000
Dist. 7-B	151,000	50	151,050	151,050
Dist. 7-C	143,000	3,575	146,575	146,575
Dist. 8	1,033,000	1,200	1,034,200	1,034,200
Dist. 9	204,000	350	204,350	204,350
Dist. 10	107,000	425	107,425	107,425
Utah	10,700	.....	10,700	10,200
Wyoming	289,200	.....	289,200	288,950
Others	‡200	.....	‡200	‡250
Total U. S.	6,669,700	135,050	**6,804,750**	6,819,550
Change from pervious week, down			**14,800**	
Canada	†499,500	.....	†499,500	†§527,800
Total U. S. production—January 1-August 31			1,786,936,025 bbl.	
Same period last year (crude plus cond.)			*1,746,628,819 bbl.	

*Includes 30,019,980 bbl. condensate. †Week ended previous Monday. ‡South Dakota. §Revised.

CRUDE-OIL STOCKS



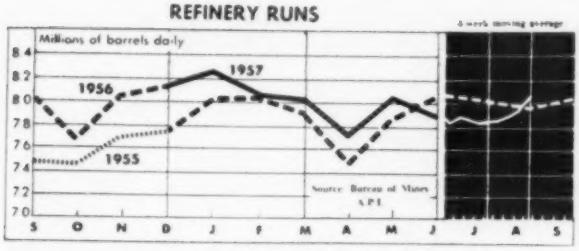
CRUDE-OIL STOCKS BY STATES OF ORIGIN*

(Thousands of barrels)

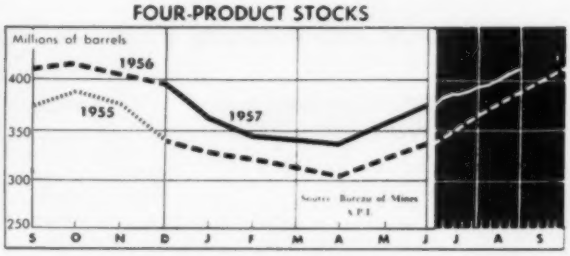
	8-24-57	8-17-57	8-25-56
Pennsylvania Grade	3,241	3,158	2,554
Other Appalachian	1,599	1,624	2,084
Illinois, Indiana, and Michigan	11,451	11,106	10,822
Nebraska, North Dakota	2,491	2,546	2,360
Kansas	11,097	10,810	9,012
Oklahoma	22,085	22,990	27,231
Arkansas	2,766	2,743	2,707
Louisiana	19,350	18,577	17,181
North	3,148	3,082	2,688
South	16,202	15,495	14,493
Mississippi, Ala. and Fla.	2,445	2,665	2,991
New Mexico	9,773	8,716	7,673
Texas	130,581	131,376	121,754
East Texas proper	10,482	10,765	9,359
West Texas	62,730	64,408	58,633
Texas Gulf	24,564	24,292	22,348
Other Texas	32,805	31,911	31,414
Wyoming	17,445	17,835	19,158
Other Rocky Mountain	6,360	6,285	7,291
California	30,124	30,075	28,789
Foreign	†16,870	16,112	15,300
Total	287,678	286,618	276,907

*Bureau of Mines. †Includes 3,827,000 bbl. in California.

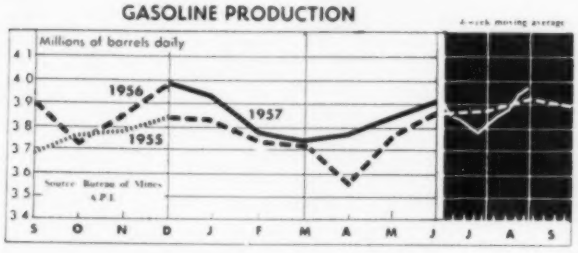
REFINERY RUNS



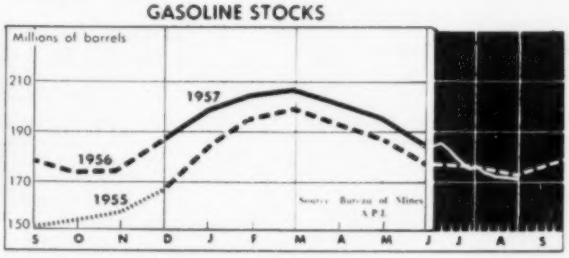
FOUR-PRODUCT STOCKS



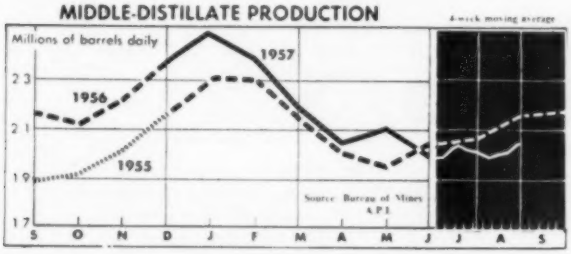
GASOLINE PRODUCTION



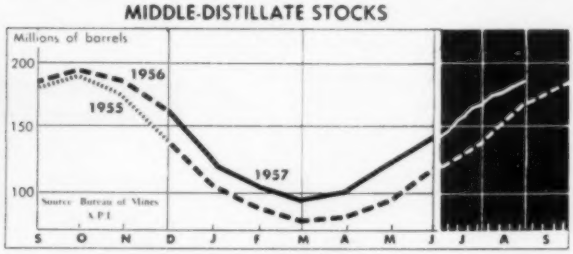
GASOLINE STOCKS



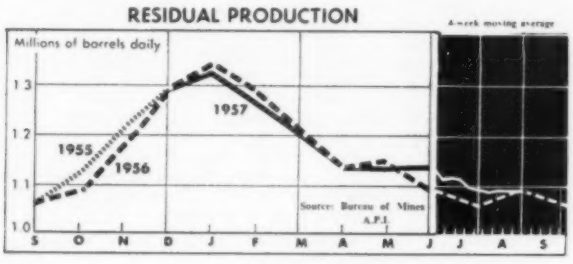
MIDDLE-DISTILLATE PRODUCTION



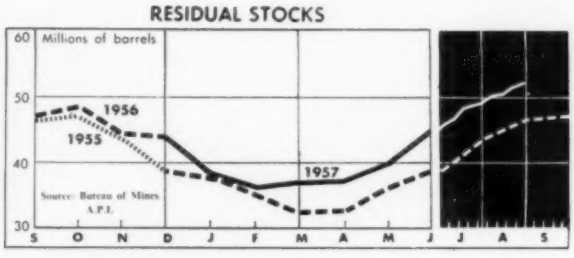
MIDDLE-DISTILLATE STOCKS



RESIDUAL PRODUCTION



RESIDUAL STOCKS



A.P.I. REFINERY REPORT, AUGUST 30, 1957

(Thousands of barrels)

District—	Daily avg. runs	Daily average production— Gaso.*	Kero.	Dist.	Resid.	Stocks‡ Gaso.†	Kero.	Dist.	Resid.	Bureau of Mines, August 1956 Daily avg. runs	Daily average production— Gaso.*	Kero.	Dist.	Resid.
East Coast	1,306	522.6	29.6	328.7	220.8	41,385	14,054	56,572	13,163	1,140	492.1	32.6	320.6	181.1
Appalachian:														
District 1	106	46.4	4.0	22.3	6.6	4,190	596	3,184	517	99	38.0	3.3	23.9	5.2
District 2	102	55.7	3.3	35.0	14.9	2,660	625	893	212	106	51.7	4.9	17.1	12.6
Ind., Ill., Ky.	1,444	705.6	60.7	281.9	153.8	29,201	6,738	21,805	4,957	1,407	739.5	72.6	286.2	150.2
Minn., Wis., Dak.	104	46.6	8.4	25.1	9.3	5,417	1,592	7,555	510	70	34.8	6.2	19.3	3.8
Okla., Kans., Mo.	789	448.6	15.1	191.3	28.9	13,863	1,894	14,105	1,037	703	375.5	15.4	167.3	29.8
Inland Texas	301	221.4	5.7	60.0	21.0	6,715	474	2,525	1,884	274	202.2	5.9	52.7	25.1
Texas Gulf Coast	1,932	965.4	80.7	504.1	223.4	23,731	3,200	18,530	8,182	1,966	948.9	111.7	498.2	241.1
La. Gulf Coast	664	356.3	35.2	164.9	53.8	9,386	3,354	7,154	1,615	714	361.2	47.9	196.3	55.1
N. La. and Ark.	90	37.2	7.3	17.9	7.0	4,031	834	2,279	177	103	38.0	5.0	24.2	6.9
Rocky Mountain:														
New Mexico	26	13.4	0.7	5.1	4.6	411	9	121	79	26	13.5	0.2	5.1	3.4
Other Rocky Mtn.	290	140.7	1.7	61.7	37.6	5,587	322	3,340	906	281	129.8	3.7	61.4	33.5
West Coast	1,173	513.7	14.9	193.6	305.3	25,106	422	16,174	19,233	1,106	497.1	4.0	166.7	343.3
Aug. 30, 1957	8,327	4,073.6	267.3	1,891.6	1,087.0	171,683	34,114	154,237	52,472	7,995	3,922.3	313.4	1,839.0	1,091.1
Aug. 23, 1957	7,970	3,999.9	246.4	1,772.4	1,101.9	171,897	33,219	149,671	52,237	.....	.....	.....	.....	.....
Aug. 31, 1956	8,098	4,030.0	313.7	1,891.6	1,136.0	175,571	32,401	138,449	46,783	.....	.....	.....	.....	.....

*At refineries including natural blended. †Finished and unfinished. ‡At refineries, bulk terminals, in transit, and in pipelines.

Crude-Oil and Refinery Prices at Representative U. S. and Foreign Points

REFINED-PRODUCT PRICES

Following quotations are for refinery products in cents per gallon moving in interstate shipments on Wednesday each week unless otherwise noted. Crude-oil prices are per barrel at the wells unless otherwise listed.

GASOLINE*

Mid-Continent (Group 3):	
Regular (89 octane)	11.50-11.75
Premium (98 octane)	14.25-14.50
Gulf Coast (cargoes for coastwise or export movements):	
Regular (90 octane)	11.00-11.50
Regular (92 octane)	11.25-11.75
Premium (97 octane)	12.75-13.25
Premium (98 octane)	13.00-13.50
California (rack):	
Regular (88 octane)	12.9
Premium (96 octane)	14.9
Premium (98 octane)	15.4
Caribbean area (cargoes):	
Regular (87 octane)	10.875
Premium (93 octane)	11.75

*Quotations are for octanes shown. Prices usually vary with octane ratings within the regular, premium, and aviation grades.

NATURAL GASOLINE*

Group 3:	
Grade 26-70	4.0
Breckenridge:	
Grade 26-70	3.5

*If 26-70 natural is considered as 100 per cent, prices for lower-vapor-pressure grades increase 2.5 per cent for each unit drop in Reid vapor pressure down to and including 16 lb. Prices for grades below 16 lb. may vary slightly by areas or plants.

KEROSINE AND DISTILLATE

Mid-Continent (Group 3):	
Kerosine 42-44	9.50-10.00
Diesel oil (58 d.i. and above)	9.125-9.75
Distillate No. 1	9.125-9.75
Distillate No. 2	8.50-9.00
Gulf Coast (cargoes):	
Kerosine 41-43	8.75-9.50
Distillate No. 2	8.75-9.50
New York Harbor (barges):	
Kerosine 41-43	10.75
Distillate No. 2	10.25
Diesel fuel, 48-52 d.i.	10.55
Caribbean area (cargoes):	
Distillate No. 2	9.00

WAX (LB.)

Oklahoma (Group 3):	
132-135 A.m.p. (semi-refined) in tank cars	6.50
New York (export):	
126-130 A.m.p. crude-scale (solid in bags or barrels)	7.35

★Denotes change from previous week.

RESIDUAL FUEL (BBL.)

Mid-Continent (Group 3):	
★Residual fuel (max. 1% S)	$1.80-2.00
Gulf Coast (cargoes):	
Bunker C fuel	$2.50-2.75
New York Harbor (barges):	
Bunker C fuel	$2.95
Caribbean (cargoes):	
Bunker C	$2.55
California (rack):	
Bunker C fuel, Los Angeles	$2.85-3.00

LUBRICATING OILS

Mid-Continent (Group 3):	
150-160 bright stock, solvent refined, 0-10 p.p., 95 v.i.	25.5
200 vis. neutral oil, solvent refined, 0-10 p.p., 95 v.i.	22.25
Pennsylvania Grade:	
145-155 vis. at 210, bright stock, 8 color, 25 p.t.	28
200 vis. neutral (180 at 100°), 25 p.t.	26

CRUDE-OIL PRICES

GRAVITY SCHEDULE

	Signal Hill, Calif.	Mid-Cont.*	Gulf Coast Tex.†	West Tex.‡ N.M.	Wyo. (sour)
14-14.9	$2.67	....	....	....	....
15-15.9	2.71	....	....	....	$1.89
16-16.9	2.74	....	....	....	1.94
17-17.9	2.78	....	....	....	1.99
18-18.9	2.82	....	....	....	2.04
19-19.9	2.85	....	....	....	2.09
20-20.9	2.89	$2.75	....	$2.62	2.14
21-21.9	2.93	2.77	....	2.64	2.19
22-22.9	2.97	2.79	....	2.66	2.24
23-23.9	3.01	2.81	$3.44	2.68	2.29
24-24.9	3.05	2.83	3.46	2.70	2.34
25-25.9	3.09	2.85	3.48	2.72	2.39
26-26.9	3.13	2.87	3.50	2.74	2.44
27-27.9	3.17	2.89	3.52	2.76	2.49
28-28.9	3.22	2.91	3.54	2.78	2.54
29-29.9	3.27	2.93	3.56	2.80	2.59
30-30.9	3.32	2.95	....	2.82	2.63
31-31.9	3.38	2.97	....	2.84	2.67
32-32.9	3.44	2.99	....	2.86	2.71
33-33.9	3.50	3.01	....	2.88	2.75
34-34.9	3.56	3.03	....	2.90	2.79
35-35.9	3.61	3.05	....	2.92	2.83
36-36.9	3.65	3.07	....	2.94	2.87
37-37.9	3.68	3.09	....	2.96	2.89
38-38.9	....	3.11	....	2.98	2.91
39-39.9	....	3.13	....	3.00	2.93
40 and up	....	3.15	....	3.02	2.95

*Includes Oklahoma, part of Kansas, North Dakota, West Texas (sweet) and North Central Texas. †Low cold test Gulf Coast. ‡Sour.

Effective dates: California January 17, 1957, east of California, January 3-January 10, 1957; Pennsylvania Grade, July 26, 1957.

Some crudes in North Central Texas and West Central Texas, are on the intermediate schedules.

FLAT PRICES

Louisiana:	
Bienville (distillate)	$3.05
Ville Platte	3.45
Texas:	
East Texas	3.25
Conroe	3.53
Van	3.08
Pennsylvania Grade:	
Bradford	4.65
Middle District	4.47
Southwest Pennsylvania	4.18
West Virginia	4.00
Buckeye Grade	4.00
Zanesville Grade	3.04
Illinois Basin	3.15
Canada:	
★Leduc-Woodbend	2.74
★Redwater (Alta.)	2.63
★Smiley (Sask.)	2.40
★Pembina	2.61

FOREIGN

Venezuela:	
Cumarebo, 48°-49.9°, Tucupido	3.75
San Joaquin, 41°-41.9°, Puerto La Cruz	3.34
Oficina, 35°-35.9°, Puerto La Cruz	3.05
Tia Juana medium, 26.5°-26.9°, Amuay*	2.55
Quiriquire, 16.5°-16.9°, Caripito	2.45
Lagunillas heavy, flat, Amuay or Las Piedras*	2.38
Bachaquero, flat, Las Piedras*	2.23

Prices for all crudes of 24° or lighter vary 2 cents per degree change, up or down. All crudes heavier than 24° vary 2.5 cents per half-degree gravity change.

*Also available at La Salina at 3 cents per barrel less.

Middle East, Persian Gulf (cargoes, f.o.b. lifting port):	
Arabian, 36.0°-36.9°, Ras Tanura	$2.12
Iranian, 34.0°-34.9°, Bandar Masur	2.04
Iranian, 34.0°-34.9°, Abadan	1.99
Iraq, 36.0°-36.9°, Fao	2.00
Kuwait, 31.0°-31.9°, Mina-al-Ahmadi	1.85
Qatar, 41.0°-41.9°, Umm Said	2.23
Middle East, E. Mediterranean:	
Arabian, 36.0°-36.9°, Sidon	2.69
Iraq, 36.0°-36.9°, Tripoli, Banias	2.69
Far East (cargoes, f.o.b. Lutong, Sarawak):	
Seria Light, 37°	2.75

TANKER RATES PER LONG TON

(Latest reported spot fixtures)

★Gulf-U.S.N.H., clean (USMC—35%)	$1.85
Carib.-U.S.N.H., dirty (USMC—55%)	1.22
★Gulf-U.K., dirty (Scale—50%) (19s. 3d.)	2.70
★P.G.-France, dirty (USMC—65%)	3.82

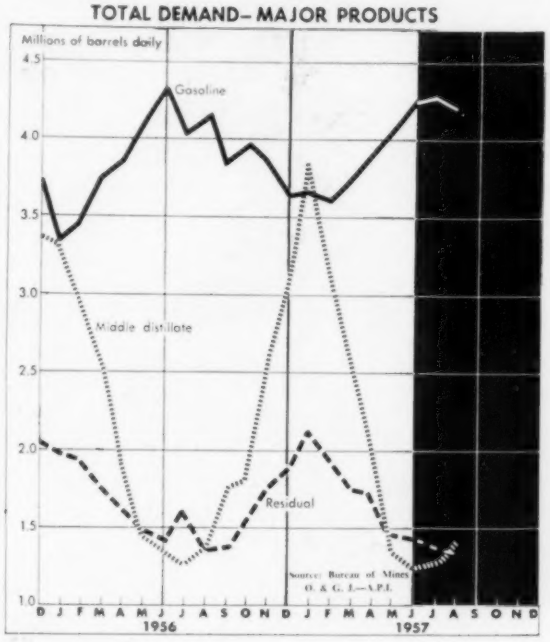
SUPPLY AND DEMAND—MAJOR PRODUCTS

(Thousands of barrels daily)

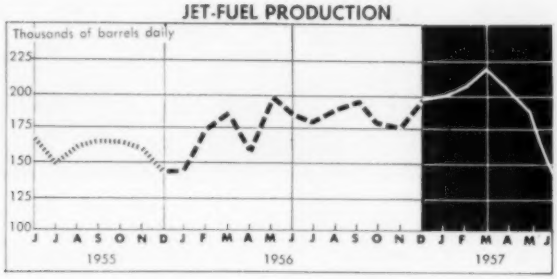
	Total demand	Refinery production	Stocks end of period†
GASOLINE			
August 1957*	4,210	3,980	171,000
July 1957*	4,280	3,800	176,170
June 1957	4,156	3,881	190,063
September 1956	3,860	3,902	177,974
August 1956	4,166	3,922	172,939
KEROSINE			
August 1957*	175	270	34,200
July 1957*	170	260	31,210
June 1957	142	254	28,872
September 1956	274	329	33,588
August 1956	225	313	31,826
DISTILLATE			
August 1957*	1,240	1,790	155,500
July 1957*	1,105	1,750	136,860
June 1957	1,150	1,773	117,364
September 1956	1,447	1,845	150,411
August 1956	1,144	1,839	137,905
RESIDUAL			
August 1957*	1,340	1,095	52,600
July 1957*	1,360	1,095	48,880
June 1957	1,366	1,101	45,572
September 1956	1,384	1,062	47,342
August 1956	1,358	1,091	46,617

*Preliminary. †Thousands of barrels.

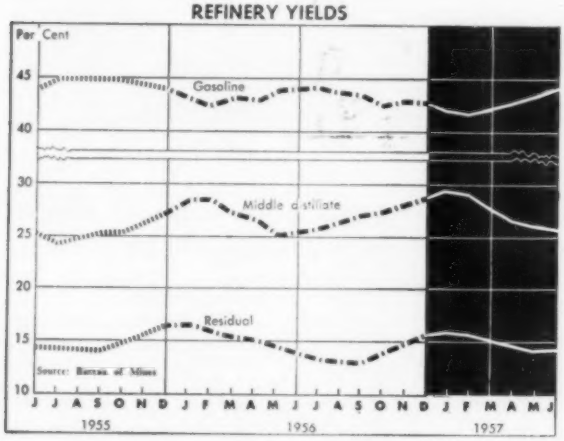
TOTAL DEMAND—MAJOR PRODUCTS



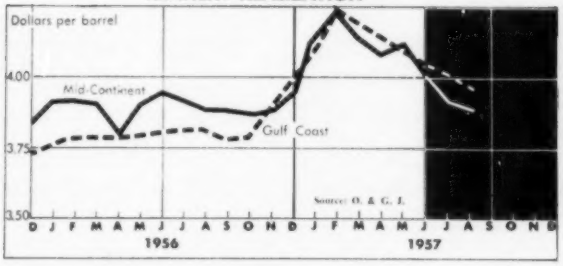
JET-FUEL PRODUCTION



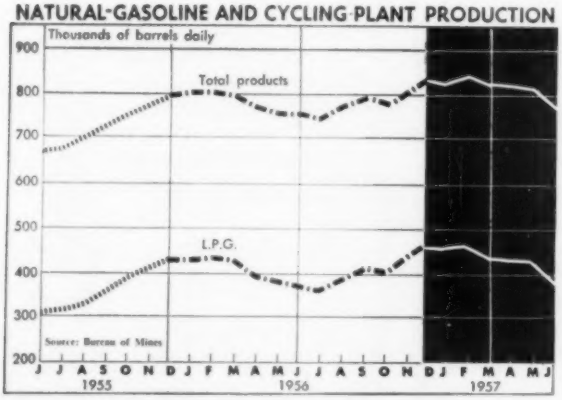
REFINERY YIELDS



REFINERY REALIZATION



NATURAL-GASOLINE AND CYCLING-PLANT PRODUCTION



REFINERY REALIZATION

	August* 1957	July* 1957	June 1957	August 1956
Mid-Continent	$3.88	$3.90	$4.08	$3.88
Gulf Coast	3.97	4.01	4.06	3.81

*Preliminary.

Refinery realization is based on yields of major products and average spot prices of regular gasoline, kerosine, No. 2 fuel, and residual as published in The Oil and Gas Journal.

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Portrait by Fabian Bachrach

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1—14' x 21' Clay Tower, 125#
1—8' x 75' Tower, 20 Trays, 25#
1—18' x 32' Tower, 15 Trays, 160#
1—8½' x 25' Tank.
5—Packed Towers 14" x 40', 18" x 23', 160# Wyatt 1950.
1—Poly Reactor, 550#, 24" x 28'.
1—12" x 27' Absorber, 20 Trays, 450#.

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3 Pacific ITB, 400 gpm.—2,000' hd. 735 gpm—3,100' hd.
5 Pacific SVTB, 612 gpm—600' hd. 324 gpm—480' hd, 308 gpm—516' hd, 193 gpm—389' hd.
1 Pacific HVTB (unused) 1270 GPM—408' Hd.
BJ hot oil pump, 3 x 9, 14 st, 324 gpm, 4600' hd.

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18—GR Fin Tubes, 73 Sq. Ft.
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8—Steel 1,000, 900, 800, 600, 500 Sq. Ft.
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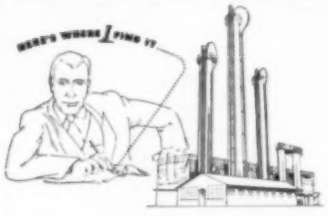

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NOTICE TO BIDDERS
OFFSHORE OIL AND GAS LEASES

The Commonwealth of Pennsylvania, Department of Forests and Waters, Harrisburg, Pennsylvania, will receive sealed bids for Petroleum and Natural Gas leases until 2:00 p.m., E.D.S.T., September 24, 1957 at Room 512, Education Building, Harrisburg, Pennsylvania, which will be publicly opened and read at that time, for the leasing of certain offshore lands in Lake Erie. The Blocks are more particularly described as follows:

BLOCK 1: All that portion of Pennsylvania's offshore waters in Lake Erie bounded on the North by latitude 42° 05' North; on the East by longitude 80° 23' West; on the South by a line parallel to the Lake shore and one-half mile therefrom; and on the West by the Ohio-Pennsylvania boundary. Extreme care shall be used in drilling within three miles of the shore to protect fish breeding grounds. Containing approximately 19,130 acres.

BLOCK 2: All that portion of Pennsylvania's offshore waters in Lake Erie bounded on the North by latitude 42° 20' North; on the East by longitude 79° 50' West; on the South by latitude 42° 15' North; and on the West by longitude 79° 55' West. Extreme care shall be used in drilling within three miles of the shore to protect fish breeding grounds. Containing approximately 16,580 acres.

The Commonwealth is considered to be the owner of these Oil and Gas rights but makes no warranty as to the presence of Oil or Gas nor as to its ownership thereof and bidders assume the risk of proving title.

Forms of the required bid proposal, the lease agreement and maps showing the areas, may be obtained by contacting The Division of Minerals, Department of Forests and Waters, Education Building, Harrisburg, Pennsylvania.

All bids must be submitted in sealed envelopes to the above address and be marked on the envelope "Bid for Oil and Gas Lease, Block 1 or 2."

A certified check, bank cashier's or trust company treasurer's check in the amount of $2,500.00 must accompany each bid for each tract as a guarantee of the bid. The proceeds of the bid check shall be retained by the Commonwealth and considered as liquidated damages if any bidder shall fail to execute a lease tendered by the Commonwealth. Checks will be returned to the unsuccessful bidder upon full execution of the lease.

The Department reserves the right to reject any and all bids and to waive any informalities, defects or irregularities in the bids.

MAURICE K. GODDARD
Secretary of Forests and Waters

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Attorney General.

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OIL AND GAS MINERAL LEASES available in Dell City area of Hudspeth County, Texas. U. S. Geological Survey Map shows anticlinal axis nearby favorable for oil-gas structure. Am fee landowner of over 2000 acres. Write quickly to: Jefferson G. Smith, 215 Littlefield Building, Austin 15, Texas.

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WANTED: Casinghead gas, 2,000 to 10,000 MCFD suitable for portable gasoline plant. Union Petroleum Corporation, Box 2657, Tulsa, Oklahoma.

WANTED—productive shallow acreage to drill. Box K-316, The Oil and Gas Journal, Tulsa, Oklahoma.

WANTED: Oil Royalty, Gas Royalty, and working interests Texas, Oklahoma. A'Mell Oil Properties, 1201 Elm, Dallas, Texas. RIverside 1-9251.

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CASINGHEAD GAS

Independent group is interested in purchasing one to three million cubic feet per day of casinghead or flare gas for compressor and/or plant processing facilities. Resources, equipment and personnel available to undertake project immediately on proof of satisfactory reserves. Would consider some partnership or joint owner arrangement. Might also consider purchase of operating property. Prefer Southern Oklahoma, Texas or Louisiana properties. Reply

Box K-327,
The Oil and Gas Journal,
Tulsa, Oklahoma.

Aero Design Continues Business as Usual

A major fire, which on August 25 destroyed the main manufacturing facility of Aero Design & Engineering Co. at Bethany, Okla., resulted in a special meeting of the board of directors. After the meeting R. T. Amis, Jr., president of the company which manufactures the twin-engine Aero Commander executive airplane, said there will be no interruption in the operations of the company or in the supply of parts to Aero Commander customers.

George T. Pew, chairman of the board, announced after the meeting that Aero Design, which has been operating without outside borrowing and without the benefit of government production contracts, is adequately financed to insure continued successful operation.

Pew stated that fortunately the company had embarked upon an expansion program some months ago and that its new plant, approximately three times the size of the facility that burned, is largely completed. The board authorized the expenditure of funds to complete the facility in the shortest possible time.

The company had 50 new airplanes in production which were undamaged and which will be delivered to distributors.

A portion of the machinery, tooling and equipment will be moved into the new factory building by approximately October 10. Already two departments of the company, the engineering department and the purchasing department, have moved into the new quarters. It is anticipated that the major assembly of production airplanes will begin on November 30 and that the first airplane will be completed in the month of January. In February production will be 50 per cent higher than it was in the destroyed plant.

The production facility destroyed by fire was only one of five main facilities of Aero Design & Engineering Co. The others include a modification center at Cimarron Field, Oklahoma City; the engineering and research division, Norman; the machine shop and tooling facility at Bethany; and the finishing facility at Downtown Airpark, Oklahoma City.

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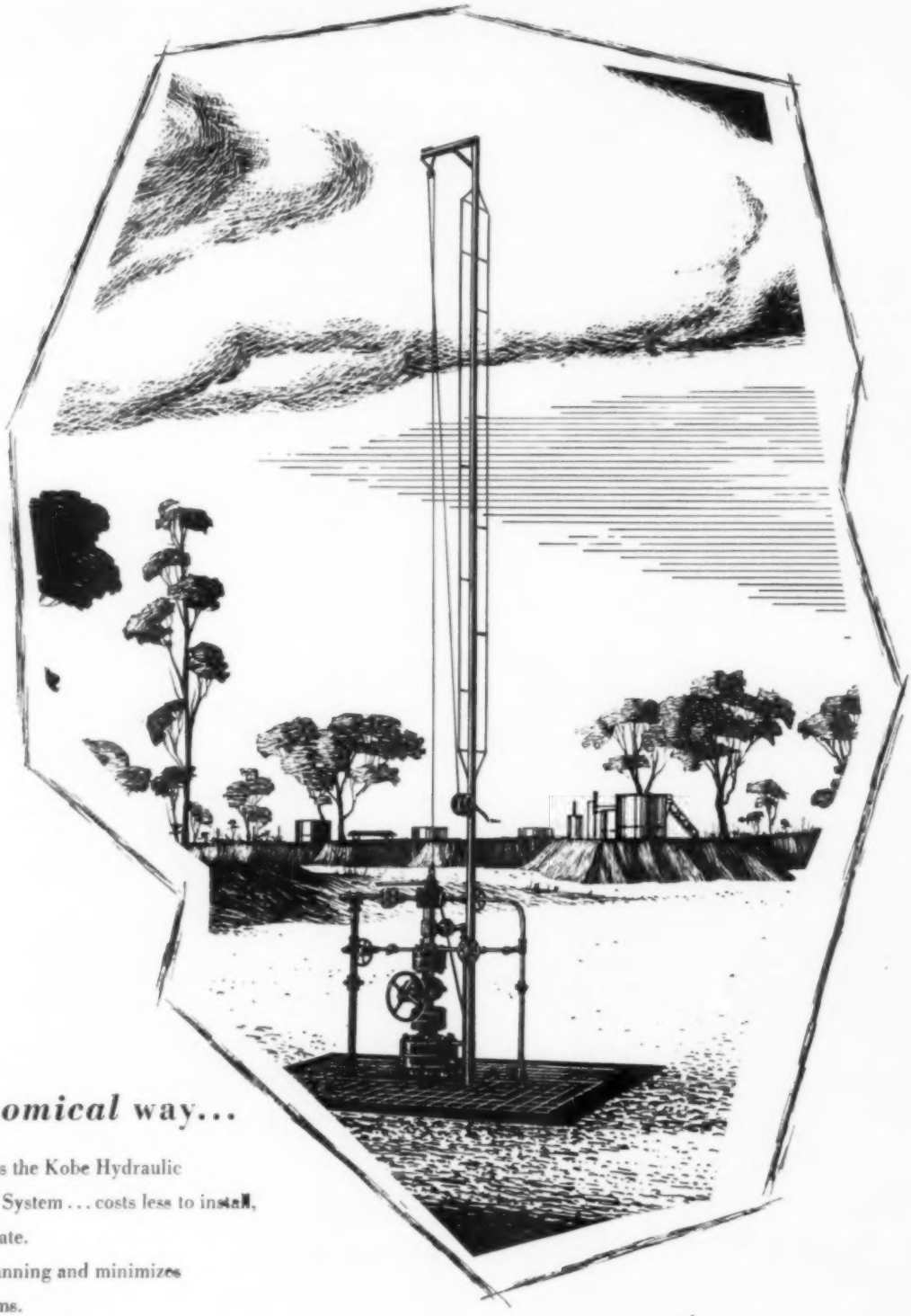
ACF Industries, Incorporated, Valve Division 27
Allison Division of General Motors 118
Alten Foundry & Machine Works, Inc. 178
American Chain & Cable—
Helicoid Gage Division 180
R-P & C Valve Division 151
Armstrong Bros. Tool Co. 136
Associated Brine Industries 185
Atlas Powder Company, Aquaness Department 8
BJ Service, Inc. 166
BJ Service, Inc., Chemical Process Subsidiary of Borg-Warner Corporation 16
Bakelite Company—
A Division of Union Carbide Corporation 28
Baker Oil Tools, Inc. 128
Barrett Division Allied Chemical & Dye Corporation 20
Beaird Company, Inc., The J. B. 21
Bethlehem Steel Co. 115
Black, Sivalls & Bryson, Inc. 74
Bower Roller Bearing Company 15
Brewster Company, Inc., The 81, 82
Broderick & Bascom Rope Co. Back Cover
Brown & Root, Inc. 69
Butler Manufacturing Company 134
Caran Engineering Corporation 141
Cardwell Mfg. Co., Inc. 174
Charles Machine Works, The 141
Chicago Bridge & Iron Company 63
Classified Advertising 201, 202, 203, 204
Corrosion Services, Incorporated 168
Crose Manufacturing Co., Inc., M. J. 138
Crutcher-Rolfs-Cummings, Inc. 145
Darling Valve and Mfg. Co. 169
Diamond Chain Company, Inc. 158
Dow Chemical Company, The 14
Dowell Incorporated 50, 91, 92, 142
Drilling & Service, Inc. 186
Duff-Norton Company 177
du Pont 5
Edward Valves, Inc. 173
Electro-Motive Division General Motors 66, 67
Elliott Company 12, 13
Fairbanks, Morse & Co. 4
Fischer & Porter Co. 34
Fleet-Line Co. 136
Ford Motor Company 112, 113
General American Transportation Corporation 70
General Paint Corp. 138
Geolograph Company, Inc., The 146
Grancell, I. H. 140
Grinnell Company, Inc. 9
Guiberson Corporation 25
Halliburton Oil Well Cementing Co. 18, 19, 182, 183
Hamer Valves, Inc. 108, 109
Helicoid Gage Division, American Chain & Cable Co. 180
Homco 43
Inferno Co., The 140
Infilco Incorporated 126
Ingalls Shipbuilding Corporation, The 30
International Harvester Co. 36, 37
Iverson Supply Company 170
Jet-Lube Inc. 149
Johns-Manville Corporation 137
Johnson-Fagg, Inc. 172
Johnston Testers, A Subsidiary of Schlumberger Well Surveying Corporation 29
Jones & Laughlin Supply Division 187, 188, 189, 190
Kane Boiler Works, Inc. 141
Kobe 206
Larkin Packer Company, Inc. 44
Levingston Shipbuilding Co. 116
Liberty National Bank and Trust Co., The 116
Lincoln Electric Company, The 144
Link-Belt Company 35
Lufkin Foundry & Machine Co. 24
Macco Oil Tool Co. 146
Magnet Cove Barium Corp. 125
Manhattan Rubber Division, Raybestos-Manhattan, Inc. 120, 121
Manzel Division of Houdaille Industries, Inc. 41
Marley Company, Inc., The 31
Mid-Continent Supply Company 32, 33
Mission Mfg. Company 1
Moore Corporation, Lee C. 46
Oil and Gas Journal, The 172
Oil Center Tool Co. 162
Oil Metering and Processing Equipment Corp. 122
Oil Well Supply Division 6
Orbit Valve Company 167
Otis Pressure Control, Inc. 175
Pacific Lumber Company, The 116
Payne Manufacturing Company, Inc. 177
Petroleum Distributing Co. 141
Pfizer & Co., Inc., Chas. 22
Philadelphia Gear Works, Inc. 133
Raybestos-Manhattan, Inc., Manhattan Rubber Division 120, 121
Reading & Bates Offshore Drilling Co. 42
Reda Pump Company 45
Reed Roller Bit Company 152, 153
Republic National Bank of Dallas 172
R-P&C Valve Division American Chain & Cable 151
Salt Water Control, Inc. 154
Schlumberger Well Surveying Corp. 10, 11
Scott-Rice Company 136
Seismograph Service Corp. 160
Snelling Manufacturing, Inc. 146
Standard Oil Company of California 77
Standard Oil Company of Indiana 139
Stewart & Stevenson Services, Inc. 26
Tennessee Corporation 122
Thomas Flexible Coupling Co. 148
Thompson Tool Co. 176
Thornhill-Craver Co. 17
Timken Roller Bearing Company Inside Front Cover
Tube Turns, Inc. 39, 40
Tuboscope Company 171
Union Carbide Corporation—
Bakelite Company 28
United Air Lines 147
United States Steel Corporation—
Oil Well Supply Division 6
Witte Engine Works Oil Well Supply Division 181
United States Treasury Department 200
Virginia Gear & Machine Corp. 133
Wagner Electric Corporation 132
Walworth Co. 7
Warren Petroleum Corporation 48
Well Equipment Mfg. Co. 179
Wheland Company, The 154
Wilson Manufacturing Co., Inc. 38
Witte Engine Works Oil Well Supply Division, United States Steel Corporation 181
W-K-M Manufacturing Company, Inc., A Subsidiary of ACF Industries Incorporated 27
Wyatt Metal & Boiler Works Inside Back Cover
Yale Machine Works 23



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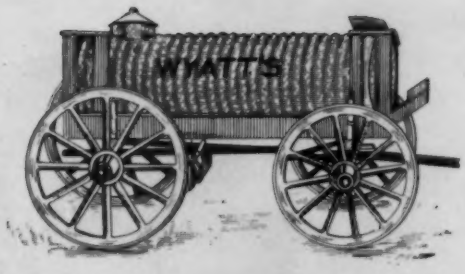

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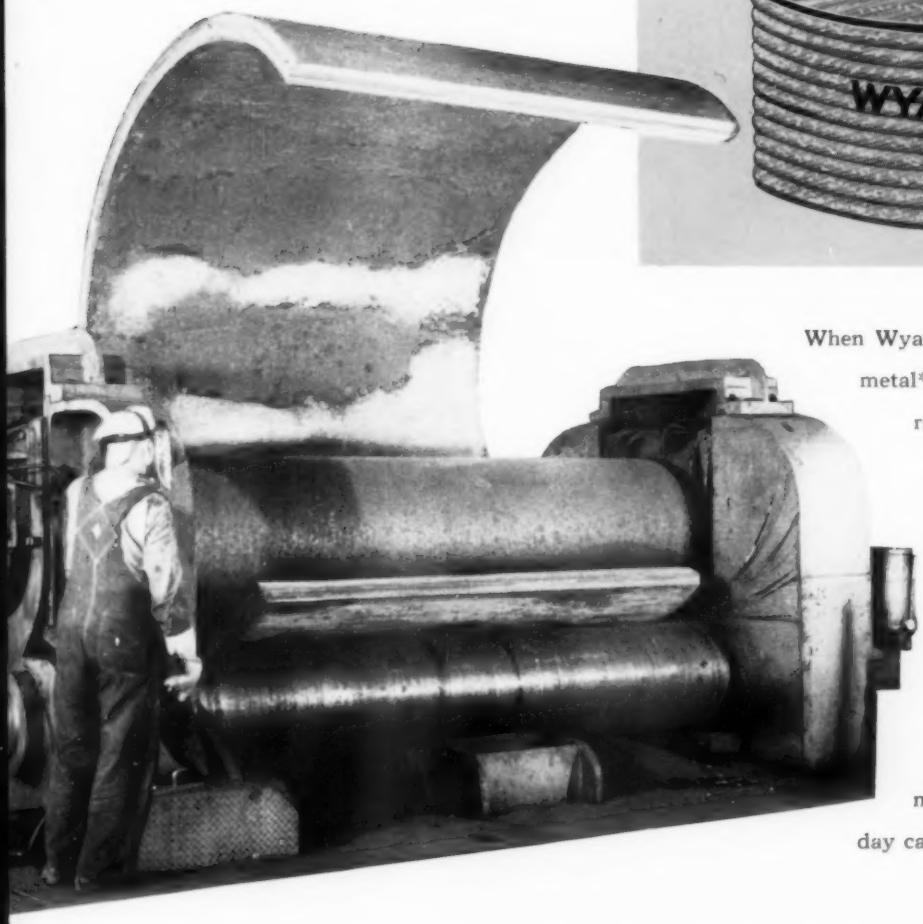

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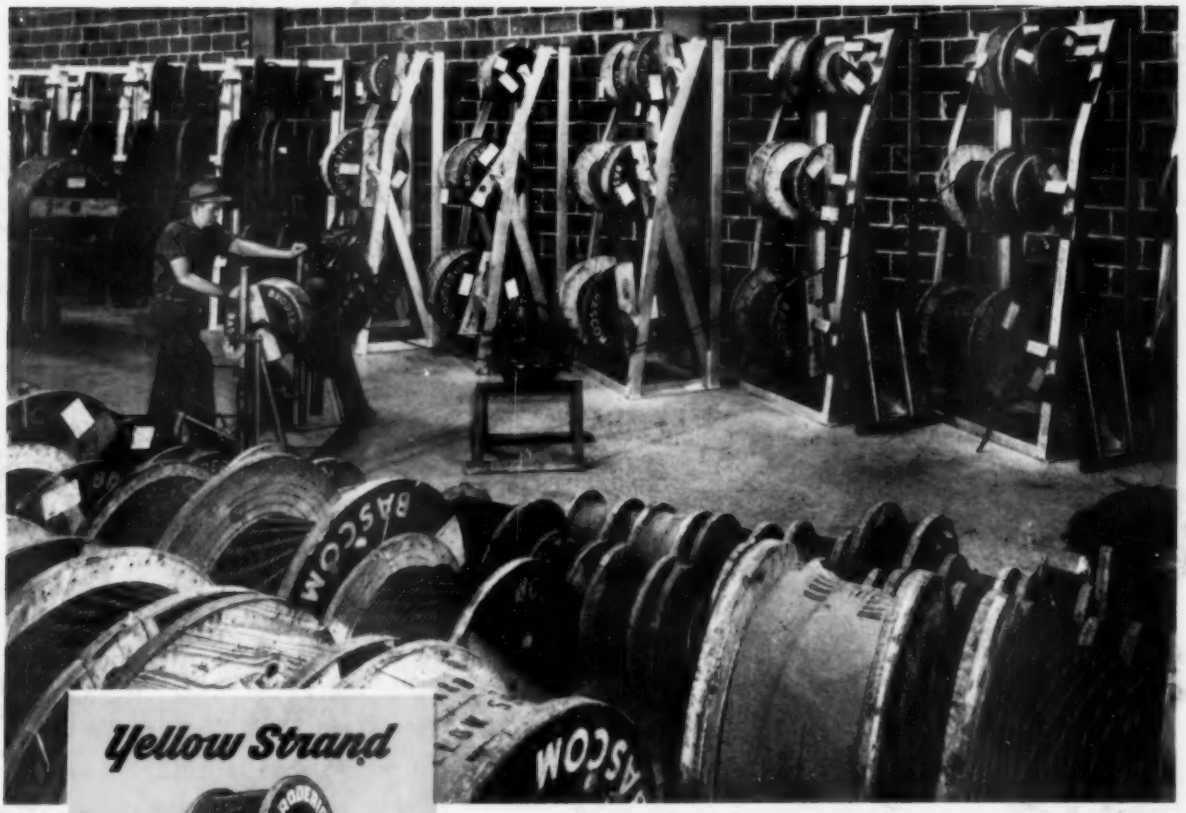

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Wherever your job may be Yellow Strand is near at hand. Distributors and factory warehouses are located throughout the entire U.S.A. Call them for the service of an expert, and longer rope life.

Where you see Yellow Strand at work, you'll see wire rope records of long life and dependability. Steady, day after day performance proves Yellow Strand's toughness, ability to "take" shock and wear of heavy loads.

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